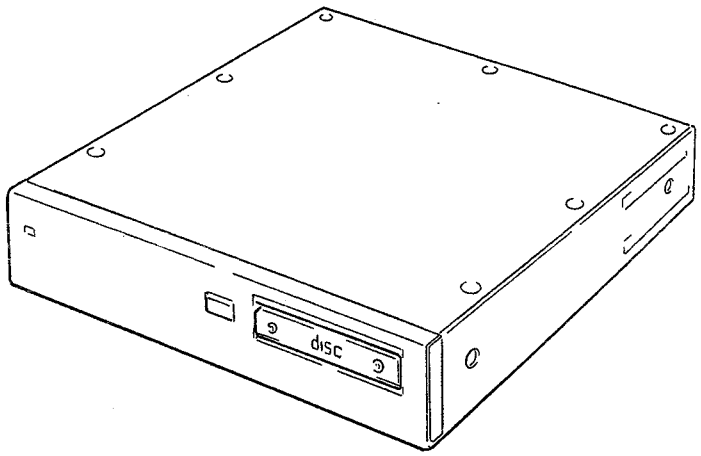
CDW-900E

SERVICE MANUAL

• For using this service manual, Section 9 of the SERVICE INFORMATION must be referred.



CD Recording Unit

SONY®

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WARNING

To prevent fire or shock hazard, do not expose the unit to rain or moisture.

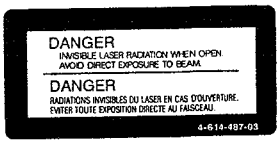
To avoid electrical shock, do not open the cabinet. Refer servicing to qualified personnel only.

WARNING — For the customers in U.S.A.
This equipment generates, uses, and can radiate radio frequency energy and if not installed and used in accordance with the instruction manual, may cause interference to radio communications. It has been tested and found to comply with the limits for a Class A computing device pursuant to Subpart J of Part 15 of FCC Rules, which are designed to provide reasonable protection against such interference when operated in commercial environment. Operation of this equipment in a residential area is likely to cause interference in which case the user at his own expense will be required to take whatever measures may be required to correct the interference.

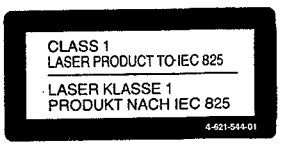
For the customers in Canada
This apparatus complies with the Class A limits for radio noise emissions set out in Radio Interference Regulations.

CAUTION
As the laser beam in this CDW-900E is harmful to the eyes, do not attempt to disassemble the cabinet. Refer servicing to qualified personnel only.

The use of optical instruments with this product will increase eye hazard.



This label is located on the top and side of the enclosure and of the internal chassis.



This recording unit is classified as a CLASS 1 LASER PRODUCT. The CLASS 1 LASER PRODUCT label is located on the rear panel.

NOTICE
This notice is applicable for USA and Canada only.

If shipped to USA, use the UL Listed power cord specified below.
If shipped to Canada, use the CSA CERTIFIED power cord specified below.

Do not use any other power cord.

Plug Cap	Parallel blade with ground pin. (NEMA 5-15P Configuration)
Cord	Type SVT or SJT, three 16 or 18 AWG wires.
Length	Maximum 15 feet
Rating	Minimum 10A, 125V

In the countries other than USA and Canada, use the power cord set approved by the appropriate testing organization for the specific countries where this unit is to be used.

This unit uses CD-ROM discs with the following mark.

When you use this unit as a CD player, use compact discs with the following mark.

SAFETY CHECK-OUT

After correcting the original service problem, perform the following safety checks before releasing the set to the customer :

Check the metal trim, "metallized" knobs, screws, and all other exposed metal parts for AC leakage. Check leakage as described below.

LEAKAGE TEST

The AC leakage from any exposed metal part to earth ground and from all exposed metal parts to any exposed metal part having a return to chassis, must not exceed 3.5 mA. Leakage current can be measured by any one of three methods.

1. A commercial leakage tester, such as the Simpson 229 or RCA WT-540A. Follow the manufacturers' instructions to use these instruments.
2. A battery-operated AC milliammeter. The Data Precision 245 digital multimeter is suitable for this job.
3. Measuring the voltage drop across a resistor by means of a VOM or battery-operated AC voltmeter. The "limit" indication is 5.25 V, so analog meters must have an accurate low-voltage scale. The Simpson 250 and Sanwa SH-63Trd are examples of a passive VOM that is suitable. Nearly all battery operated digital multimeters that have a 20 V AC range are suitable. (See Fig. A)

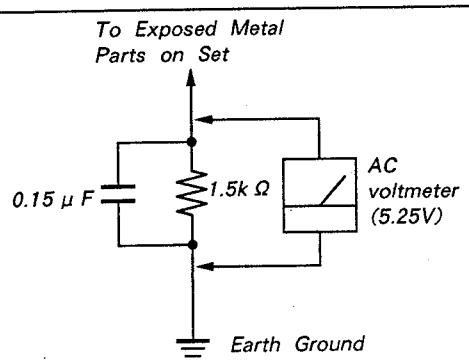


Fig. A. Using an AC voltmeter to check AC leakage.

SAFETY-RELATED COMPONENT WARNING!!

COMPONENTS IDENTIFIED BY MARK ⚠ OR DOTTED LINE WITH MARK ⚠ ON THE SCHEMATIC DIAGRAMS AND IN THE PARTS LIST ARE CRITICAL TO SAFE OPERATION. REPLACE THESE COMPONENTS WITH SONY PARTS WHOSE PART NUMBERS APPEAR AS SHOWN IN THIS MANUAL OR IN SUPPLEMENTS PUBLISHED BY SONY.

ATTENTION AU COMPOSANT AYANT RAPPORT À LA SÉCURITÉ!

LES COMPOSANTS IDENTIFIÉS PAR UNE MARQUE ⚠ SUR LES DIAGRAMMES SCHÉMATIQUES ET LA LISTE DES PIÈCES SONT CRITIQUES POUR LA SÉCURITÉ DE FONCTIONNEMENT. NE REMPLACER CES COMPOSANTS QUE PAR DES PIÈCES SONY DONT LES NUMÉROS SONT DONNÉS DANS CE MANUEL OU DANS LES SUPPLÉMENTS PUBLIÉS PAR SONY.

SECTION 1
GENERAL

Specifications

■ Discs

Writable discs (complying with the Orange Book specification)

Diameter	12 cm or 8 cm
Disc speed	1.2 m/s to 1.4 m/s

■ Interface connectors

CONTROL I/F connectors	36-pin, Amphenol-type connectors (× 2)
INTERFACE connectors	50-pin, Amphenol-type connectors (× 2)
DATA IN connector	Optical fiber connector
DATA OUT connector	Optical fiber connector
DIGITAL OUT connector	Optical fiber connector

■ Environmental conditions

Operating	
Temperature	5 to 35 °C (41 to 95 °F)
Humidity	15 to 90 % R.H.
Storage	
Temperature	–30 to 55 °C (–22 to 131 °F)
Humidity	15 to 90 % R.H.

■ General

Supply voltage	
U.S.A. and Canada	100 to 120 V AC, 50/60 Hz
Europe	220 to 240 V AC, 50/60 Hz
Current consumption	
U.S.A. and Canada	0.5 A
Europe	0.3 A
Weight	7.5 kg (16.5 lb)
Dimensions	424 × 88 × 420 mm (W/H/D) (16.7" × 3.5" × 16.5")
Supplied accessories	SCSI cable (1) SCSI terminator (1)

Design and specifications are subject to change without notice.

Introduction

How to Use This Guide

This guide is provided for users who install and operate the CDW-900E CD (Compact Disc) recording unit.
This guide describes the following:

- Introduction
- Getting Started
- Using the Unit
- Precautions
- Specifications

For control by software from the host computer, refer to the SCSI Protocol Manual.

Features

The CDW-900E CD Recording Unit is a device for accepting information from a host computer and writing it to a CD-WO (Compact Disc - Write Once) disc. The internal encoder converts the data from the host computer to the appropriate CD-ROM, CD-ROM XA, CD-I or audio format, and then the writer block writes this data on the CD-WO disc.

A CD written by this unit complies in all respects with the Red Book, Yellow Book and Green Book standards, and may therefore be used with any current commercially available CD player, CD-ROM drive or CD-I player.

Summary of features

- Uses a SCSI bus (ANSI SCSI X3.131-1986).
- Supports CD-ROM, CD-ROM XA, CD-I and audio formats.
- Real time mode and double-speed writing mode.
- Sync/Header/EDC/ECC/CIRC/Scrambling and Subcode data is subject to conversion.
- The data then undergoes EFM (Eight to Fourteen Modulation) for writing to the disc, and the resulting signal is also provided as an output.
- Up to sixteen CDW-900E or CDW-W1 CD Recording Units may be connected and controlled together.

Recordable Discs

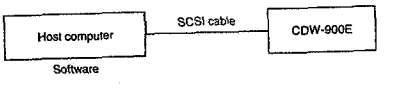
The CDW-900E CD Recording Unit can record on any CD-WO disc which complies with the Orange Book standard.

System Configuration

A complete recording system requires the following components:

- Host computer, equipped with SCSI interface, or fitted with SCSI host adaptor
- CDW-900E CD Recording Unit
- SCSI cable
- Software

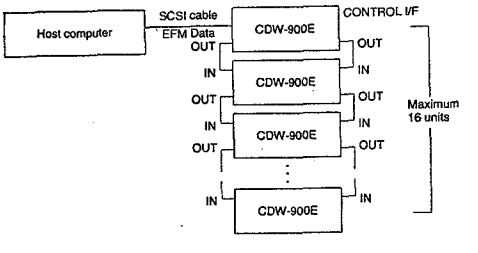
The basic configuration is as follows:



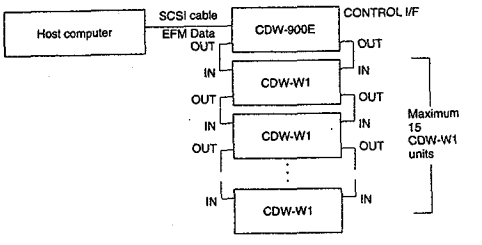
If required, you can also use the unit in combination with other SCSI devices, CDW-W1 units, or other CDW-900E units.

■ Example configurations

Using a number of CDW-900E units



In combination with existing CDW-W1 units



Location and Function of Parts

■ Front panel

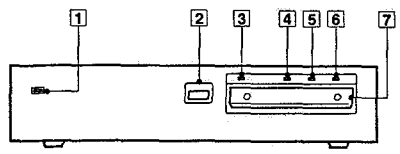


Figure 1. Front Panel

1 POWER indicator
Lights green when the unit is powered on.

2 OPEN/CLOSE button
Press to open/close the disc tray in order to insert or remove a disc.
While the unit is writing or reading, this button does not function unless held down continuously for several seconds, to prevent inadvertent operation.
If inhibited by a command from the host computer, this button does not function at all.

3 DISC indicator
This has three states, as follows.
Off: There is no disc loaded, or the disc tray is open.
Flashing: The disc tray is opening or closing, or the unit is determining the disc type.
On: There is a disc loaded.

4 READ indicator
This shows the following two states.
Flashing: A playback command is being processed.
On: Playback is in progress.

5 WRITE indicator
This shows the following three states.
Rapid flashing: Preparation for writing data.
On: Writing data.
Slow flashing: The disc may not be recorded with the correct power. Play back the disc to check.

6 ×2 SPEED indicator
Lights when writing in double-speed writing mode.

7 Disc tray
The disc loads in this tray. Press the OPEN/CLOSE button to open or close this tray in order to insert or remove a disc.

■ Rear panel

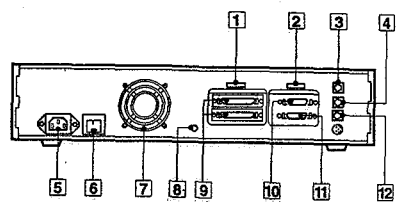


Figure 2. Rear Panel

1 Encoder DIP switches
Set the SCSI ID for this unit, and the encoder functions. See page 1-3 for details.

2 Writer DIP switches
Set the writer ID and the functions of the writer block. See page 1-3 for details.

3 DATA OUT connector
When daisy-chaining to other CDW-900E or CDW-W1 units for simultaneous data writing, this outputs the EFM data to the next unit.

4 DATA IN connector
When daisy-chained to other CDW-900E or CDW-W1 units for simultaneous data writing, this inputs the EFM data from the previous unit.

5 AC IN connector
Connect the AC power cord (not supplied).

6 POWER switch
Press the top of the switch to power on.
Press the bottom of the switch to power off.

7 Fan
This provides the necessary cooling for the interior of the unit. Ensure that nothing blocks the supply of air to the fan inlet.

8 GND terminal
Frame ground. When using a number of units together, connect the GND terminals together.

9 INTERFACE CONNECTOR (SCSI)
Connect to the host computer using the supplied SCSI cable. The other connector can be used for a daisy-chain connection to another SCSI device (hard disk drive, CR-ROM drive, etc.). If no other device is connected, be sure to fit the supplied SCSI terminator.

10 CONTROL I/F OUT connector
When daisy-chaining to other CDW-900E or CDW-W1 units for simultaneous data writing, this outputs the control signals (START, STOP etc.) to the next unit.

11 CONTROL I/F IN connector
When daisy-chained to other CDW-900E or CDW-W1 units for simultaneous data writing, this inputs the control signals (START, STOP etc.) from the previous unit.

12 DIGITAL OUT connector
When playing back a disc, this outputs a signal of digital audio interface type 2, form 1 format.

Getting Started

DIP Switch Settings

■ Encoder settings

The encoder DIP switches set the SCSI ID and the internal encoder functions.
The figure below shows the default settings.
Always power off the unit before changing DIP switch settings.

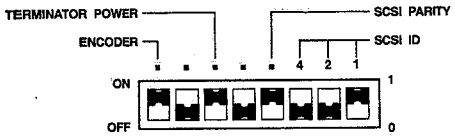


Figure 3. Encorder Settings

Encoder functions

Switch	ON	OFF
ENCODER	Use the encoder in this unit.	Accept data from an external encoder and write directly to disc.
TERMINATOR POWER	Supply SCSI terminator power to other device.	Do not supply SCSI terminator power to other device.
SCSI PARITY	Parity check on data transmission	No parity check on data transmission

ON: up OFF: down ▭ default setting

SCSI ID setting

SCSI ID	SCSI ID switches 4	2	1
0	0	0	0
1	0	0	1
2	0	1	0
3	0	1	1
4	1	0	0
5	1	0	1
6	1	1	0
7	1	1	1

1: up 0: down ▭ default setting

Notes
- The SCSI ID must not clash with that of other devices on the same connection, or the unit will not function correctly.
- Switches not specified above may be set to either up or down.

■ Writer settings

The writer DIP switches set the writer ID address and the functions of the writer block.
The figure below shows the default settings.
Always power off the unit before changing DIP switch settings.

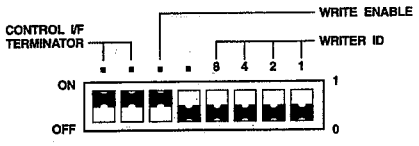


Figure 4. Writer Settings

Writer functions

Switch	ON	OFF
CONTROL I/F TERMINATOR	When there is no CDW-900E connected for simultaneous data writing or the drive is the last device in a daisy chain, these two switches must both be in the ON position.	When a number of CDW-900E units are connected in a daisy chain for simultaneous data writing and the drive is not the last device in the chain, both switches must be in the OFF position.
WRITE ENABLE	Data writing enabled.	Data writing inhibited.

ON: up OFF: down ▭ default setting

Writer ID setting

Writer ID	WRITER ID switches 8	4	2	1
0	0	0	0	0
1	0	0	0	1
2	0	0	1	0
3	0	0	1	1
4	0	1	0	0
⋮		⋮		
13	1	1	0	1
14	1	1	1	0
15	1	1	1	1

1: up 0: down ▭ default setting

Notes
- When a number of CDW-900E or CDW-W1 units are connected together, the writer IDs must all be different. If there is a clash, the unit will not function correctly.
- Switches which are not listed above may be set to either up or down.

Connections

Always ensure that the unit is powered off before making any connections to the rear panel.

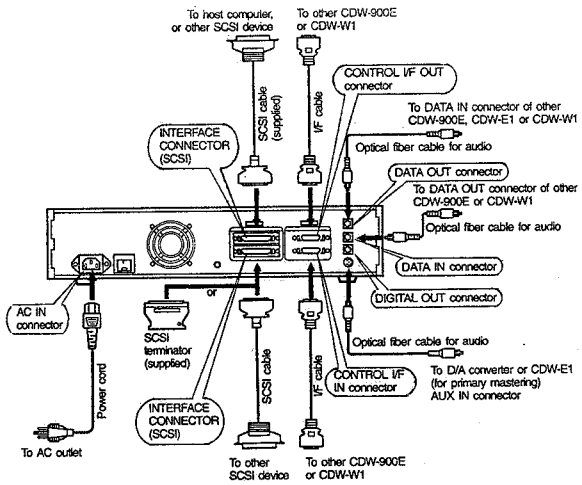

To host computer, or other SCSI device
To other CDW-900E or CDW-W1
CONTROL I/F OUT connector
To DATA IN connector of other CDW-900E, CDW-E1 or CDW-W1
Optical fiber cable for audio
DATA OUT connector
To DATA OUT connector of other CDW-900E or CDW-W1
Optical fiber cable for audio
DATA IN connector
DIGITAL OUT connector
Optical fiber cable for audio
To D/A converter or CDW-E1 (for primary mastering) AUX IN connector
INTERFACE CONNECTOR (SCSI)
SCSI cable (supplied)
I/F cable
AC IN connector
Power cord
To AC outlet
or
SCSI terminator (supplied)
CONTROL I/F IN connector
INTERFACE CONNECTOR (SCSI)
SCSI cable
I/F cable
To other SCSI device
To other CDW-900E or CDW-W1

Figure 5. Connections

Notes
- If this unit is the last device in a daisy-chain for simultaneous data writing, set the TERMINATOR switches (writer DIP switches) to the ON position.

Using the Unit

This section describes the entire basic recording operation, from loading to unloading the disc.

Starting the Unit

1 Power on the CDW-900E unit, and any other recording equipment connected.

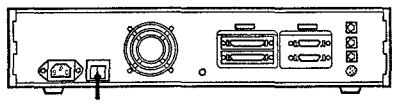


Figure 6. Turning on the unit

2 Power on the host computer and other SCSI devices.

3 Press the OPEN/CLOSE button to open the disc tray.

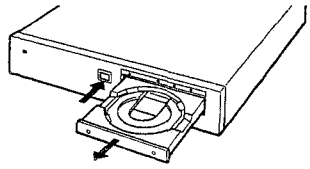


Figure 7. Opening the disc tray

4 Place the disc on the tray with the recording (green) side down.

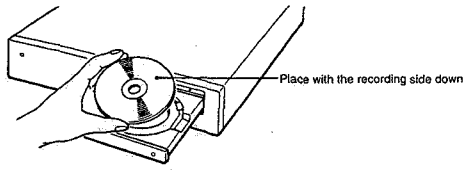


Figure 8. Inserting the disc

5 Press the OPEN/CLOSE button to close the tray.
The DISC indicator flashes for 10 to 20 seconds, then lights continuously. Next the READ indicator flashes for 10 to 20 seconds, then goes off.

6 Use commands from the host computer to carry out the writing to the disc, and playback if necessary.
For details of the commands, see the SCSI Protocol Manual.

When a write command is issued, the WRITE indicator flashes, then a few seconds later lights continuously.
When a read command is issued, the READ indicator flashes, then a few seconds later lights continuously.
In double-speed writing mode, the ×2 SPEED indicator lights.

Removing the Disc

When writing or reading is completed, press the OPEN/CLOSE button to open the disc tray. After removing the disc, always press the OPEN/CLOSE button again to close the tray.

Note
Pressing the OPEN/CLOSE button while writing to the disc results in an error, and the disc may be unusable as a result.

Precautions

Recording Unit

■ Safety

Power supply
- Use the unit with a 100 to 120 V AC power supply in the U.S.A. and Canada, and 220 to 240 V AC in Europe.
- Do not connect the unit to the same outlet as high consumption equipment such as shredders and copiers.

Power cord
- Do not place or drop heavy objects on the power cord, or damage it in any way. It is dangerous to use the unit with a damaged power cord.
- When disconnecting the power cord from the AC outlet, hold the plug and not the cord. Pulling the cord may damage it.
- If not using the unit for a long period, disconnect from the AC outlet.

■ Preventing failures

Do not subject the unit to shock or vibration.
If the unit is dropped or subjected to a violent shock it may cease to function.

Use the unit in a level position.
This unit is designed to be used in a horizontal position. Do not use it in a vertical or inclined orientation.

Installation location
Do not use or store the unit in a location subject to:
- High humidity
- *Excessive dust*
- High temperatures
- Mechanical vibration
- Direct sunlight
- Extreme changes of temperature

Condensation
If moved from a cold place to a warm place, or if the ambient temperature rises suddenly, the unit may be subject to condensation. After a change of temperature, do not use the unit immediately; leave it to acclimatize for at least an hour. Attempting to use the unit while condensation is present may result in damage to the unit or to the disc. If there is any possibility of condensation, remove the disc immediately.
Leaving the unit powered on, with no disc loaded, will clear condensation quickly.

Moving the Unit
If not using the unit, always remove the disc. Do not move the unit with a disc in place. While the unit is operating, the disc rotates at a high speed. Moving the unit while operating may result in unstable operation, or possibly damage to the disc.

Cleaning
If the cabinet is dirty, wipe clean with a dry soft cloth. If the unit is very grimy, use a cloth moistened with a mild detergent solution, then wipe with a dry cloth. Do not use solvents such as alcohol or benzine, as these may damage the finish or remove indication lettering.

In the event of problems
If the unit should malfunction, disconnect it from the AC outlet, and contact your dealer or an authorized Sony dealer.

Discs

- Handle discs without touching the recording surface (green).
- Do not write on the discs or attach any labels.

■ Storage

- Avoid storing the discs in a location subject to:
  - Direct sunlight
  - High humidity
  - Particularly in summer, in a car or any other place where the temperature may rise excessively.
- Always store discs in their storage cases. Piling them up or stacking them at an angle when not in their cases can lead to deformation or scratching.

■ Care of discs

Sony CDM-1K/2K cleaning kit is recommended.
- Before playing a disc, wipe any dust or fingerprints from the recording surface with the cleaning cloth (not supplied).
- Organic solvents, including cleaners and anti-static preparations intended for vinyl records can damage CDs, and should be avoided.
- Wipe the disc lightly with a soft cloth, always in the radial direction, from the center of the disc outwards.

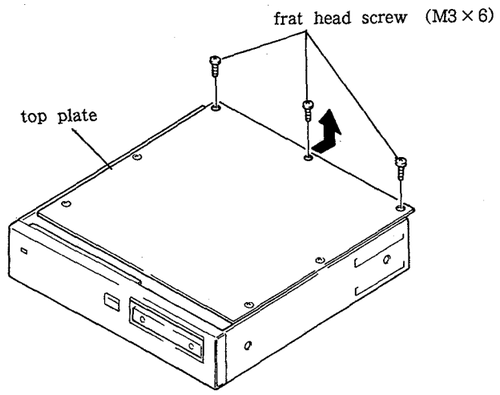
Figure 9. Cleaning discs

- If a disc is badly soiled, use a soft cloth soaked in water and wrung out well to wipe the marks from the surface. Then use a soft dry cloth to remove remaining moisture.

SECTION 2
DISASSEMBLY

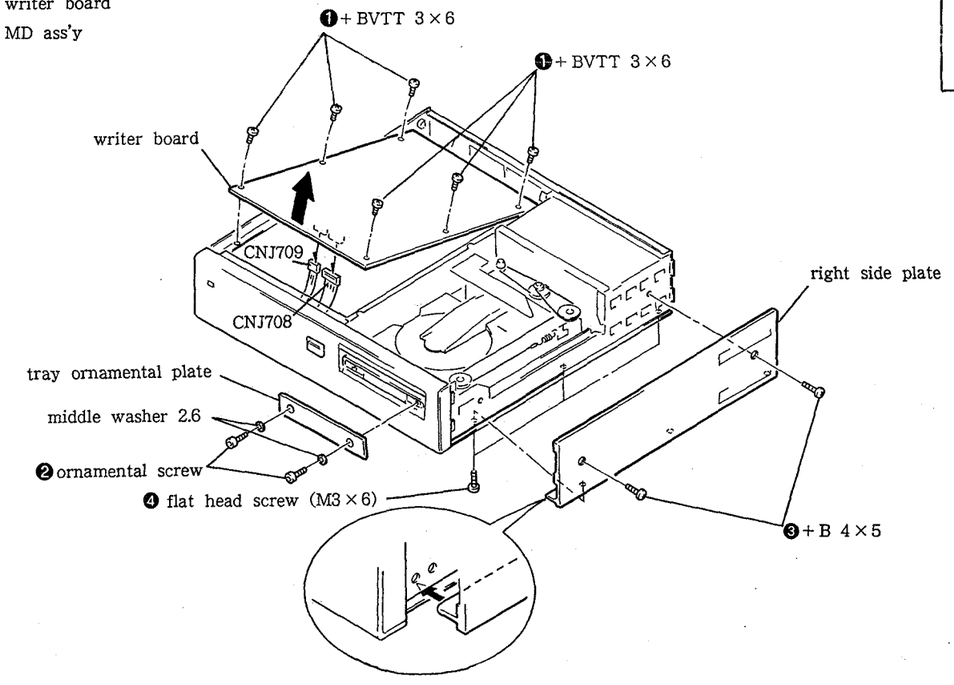
NOTE : Follow the disassembly procedure in the numerical order given.

【TOP PLATE】

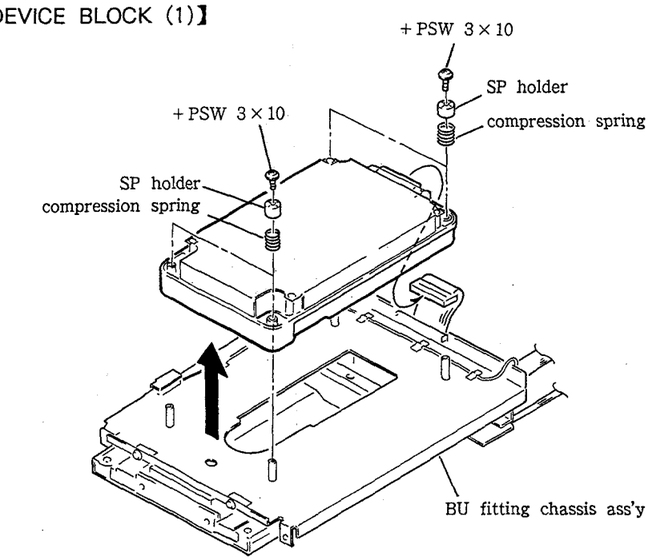


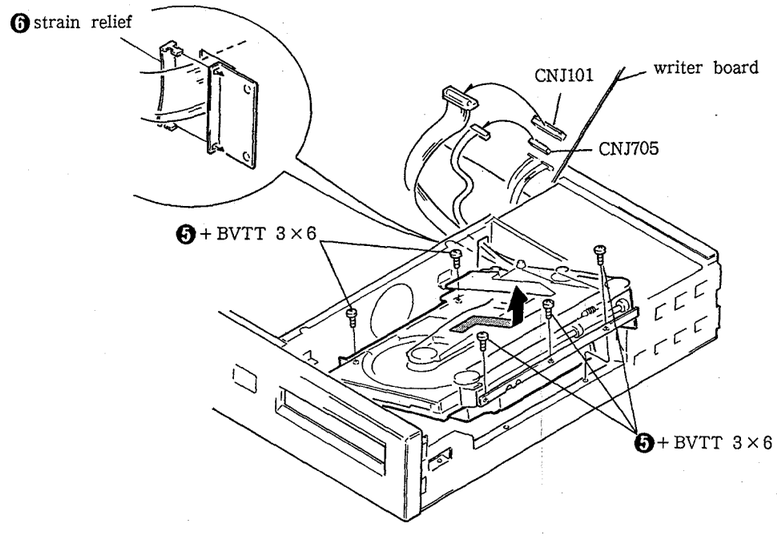
【WRITER BOARD, MD ASS'Y (1)】

❶ : writer board
❷ – ❺ : MD ass'y



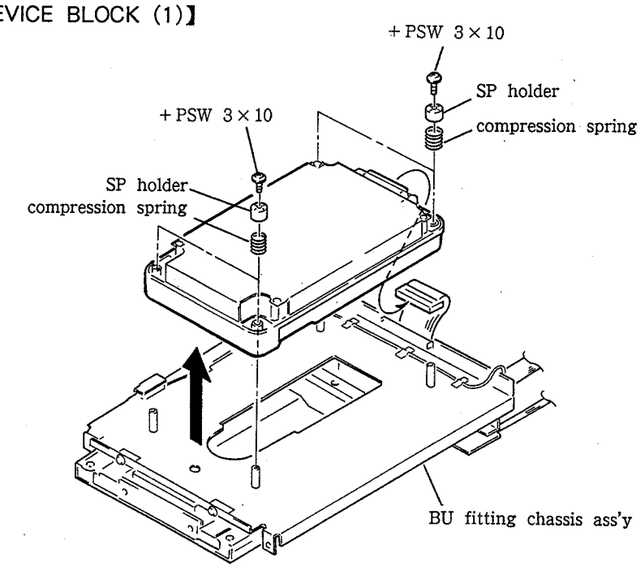
【OPTICAL DEVICE BLOCK (1)】

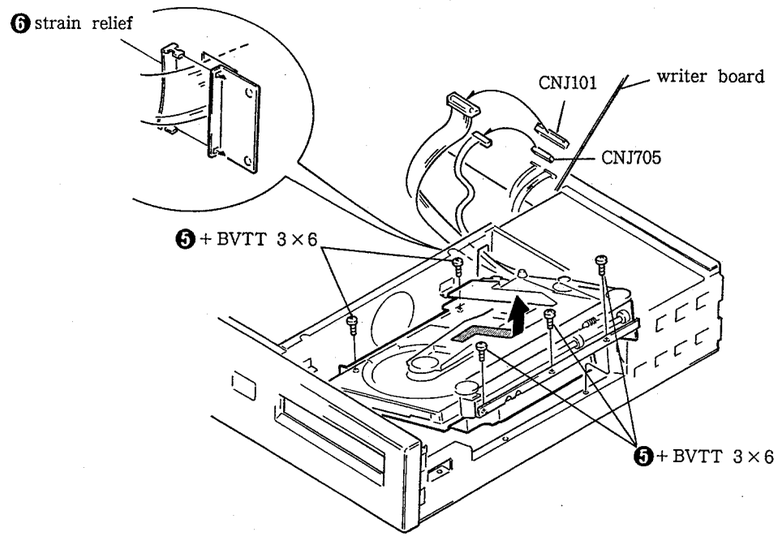




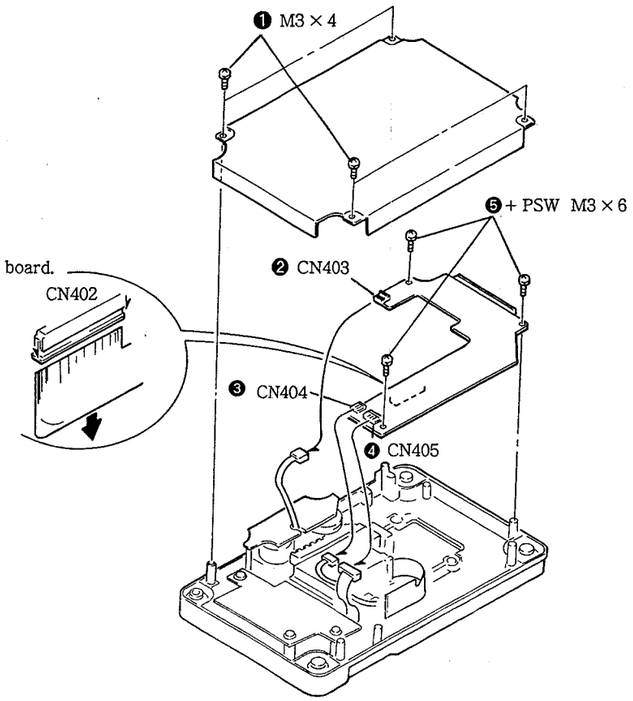
late

【OPTICAL DEVICE BLOCK (1)】

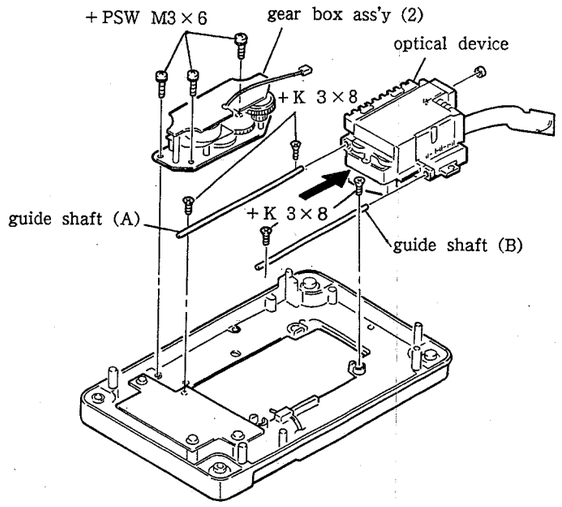




【OPTICAL DEVICE BLOCK (2)】



【OPTICAL DEVICE BLOCK (3)】



SECTION 3
THEORY OF OPERATION

3-1. THE CD-R MEDIUM

The CD-R medium, as shown in Figure 1, consists of a polycarbonate substrate (PC Substrate), a spin-coated organic pigment recording layer (Dye Recording Layer), a reflection layer of deposited gold vapor (Reflection Layer), and a plastic protective layer (Protective Layer). Although there are no pits in an unrecorded disc, there is a guide line called the "pre-groove". This guide line controls the tracking servo during recording.

The pre-groove wobbles slightly. When the carrier frequency of this wobble is FM modulated, it corresponds to a time code called ATIP (Absolute Time In Pre-groove), which indicates an absolute address (equivalent to the subcode Q channel of a CD) on the disc. This code is used to control the spindle servo during recording, and to manage the recording address.

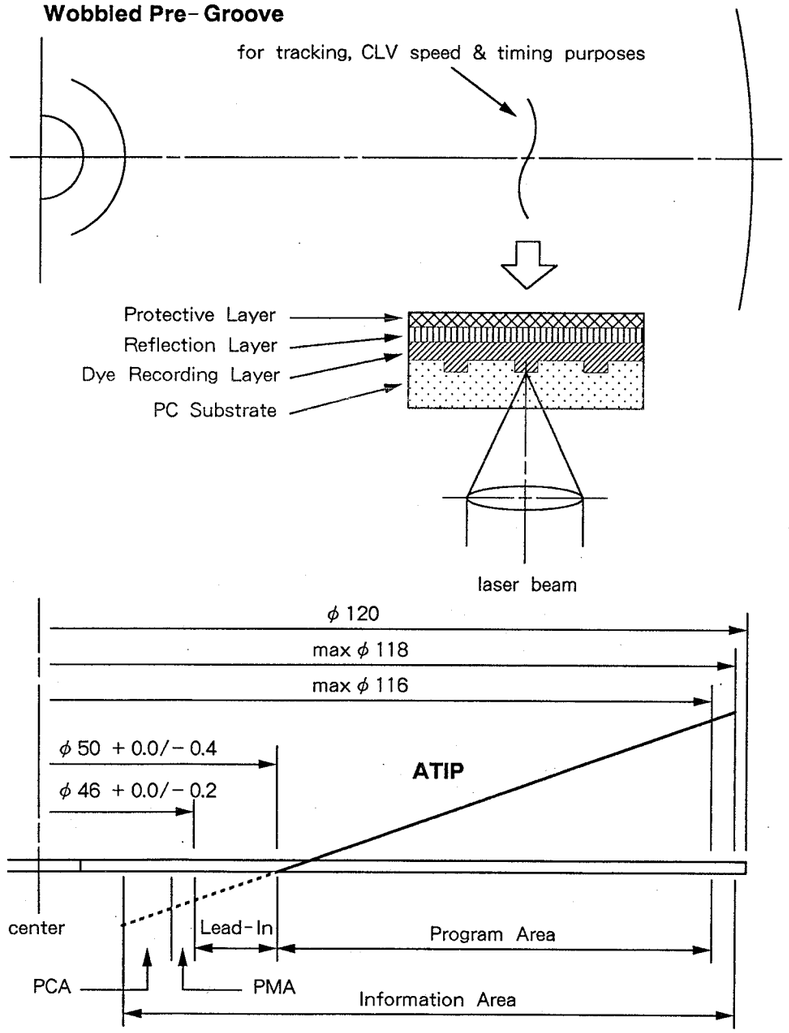


Fig 1. Principle of Recording

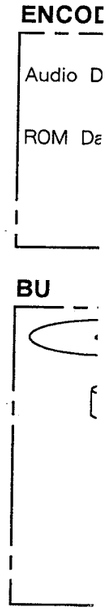
Data is recorded on a CD-R by controlling the laser output power with a string of binary digits (" 1 " or " 0 "), at the same time as controlling the tracking and spindle servos using the pre-groove. The unrecorded CD-R disc has a high reflection ratio over most of its surface. When a high-intensity laser beam irradiates a point in the pre-groove, the heat generated changes the optical characteristics of the recording layer at that point. The point acquires a low reflection ratio, like the pit in a CD. When the irradiating laser beam is low-intensity, the point is unaffected. Thus, lines of pits and lands corresponding to the binary data, similar to those in a conventional CD, are formed in the medium. When the CD-R medium is played back on a CD player, the pre-groove scarcely affects reading, and the pits are dominant. That is why a recorded CD-R can be played back in completely the same way as a conventional CD.

The CD-R medium has special areas called the PCA (Power Calibration Area) and the PMA (Program Memory Area) inside the conventional lead-in area. These areas are used by CD-R recorders only. (Conventional CD players cannot access these areas.)
The PCA is an area used to determine the optimum laser intensity for writing. Because the heat of the laser beam forms the pits, the laser output power greatly influences the quality of the recording. Therefore, the optimum laser output power must be determined before recording. To determine the optimum laser output power, the CD-R recorder writes dummy data to the PCA while changing the laser output power. The PCA is then played back to check the condition of the pits.
The PMA stores tentative TOC information during recording, and it is used by recorders which have an incremental recording function. (The CDW-900E does not use it.) The TOC contains the information about the contents of the whole disc, which must be determined before the TOC is recorded. However for a CD-R, which is recordable, it is impossible to write the TOC while data is being recorded, because the contents are not completely determined. Therefore, while data is being added, the recorded disc information is temporarily stored in the PMA. When it is determined that no more data is to be added, the disc information stored in the PMA is copied to the TOC.

3-2. PRINCIPLE OF RECORDING

Figure 2 shows the function block of the CDW-900E diagram. The CDW-900E mainly consists of an encode block, a writer block, and a base unit.
The encode converts CD-ROM or audio data, transferred from the host computer via the SCSI interface, into an EFM signal. This EFM signal is fed to the writer block, and is recorded on the disc according to the format specified in the specifications. The encode also acts as a master and controls the writer block. It is possible to turn the encode block off. When it is off, the CDW-900E operates as a secondary writer and another CDW-900E acts as the master.
The writer block equalizes the received EFM signal and outputs it to the base unit. At the same time, the writer block operates the servo circuits and the laser control circuit which are included in it.
The base unit consist of the optics and various circuits such as the laser driver. It switches the laser output depending on the equalized EFM signal, and forms pits on the disc.

The following describes the operation of each block in detail :
The encode receives the CD-ROM or audio data to be recorded through the SCSI interface, and stores it in the buffer memory. The data is output from the buffer memory to the encoding circuit. The encode controls the buffer to make sure that the data does not overflow from the buffer memory.
For CD-ROM data, the encoding circuit adds a header and an EDC (Error Detection Code) to data. It also generates an ECC (Error Correction Code) for the CD-ROM data and adds it to data. The data is then " scrambled ", and a CD-ROM SYNC is added. After that, the data is processed in the same way as audio data.
For audio data, the process starts from here. First, the original data is interleaved while the CD audio ECC is generated and added. Then the subcode is added and the data is converted to the EFM signal. This process converts the data into a form which is suitable for recording onto disc. The signal is sent to the writer block.



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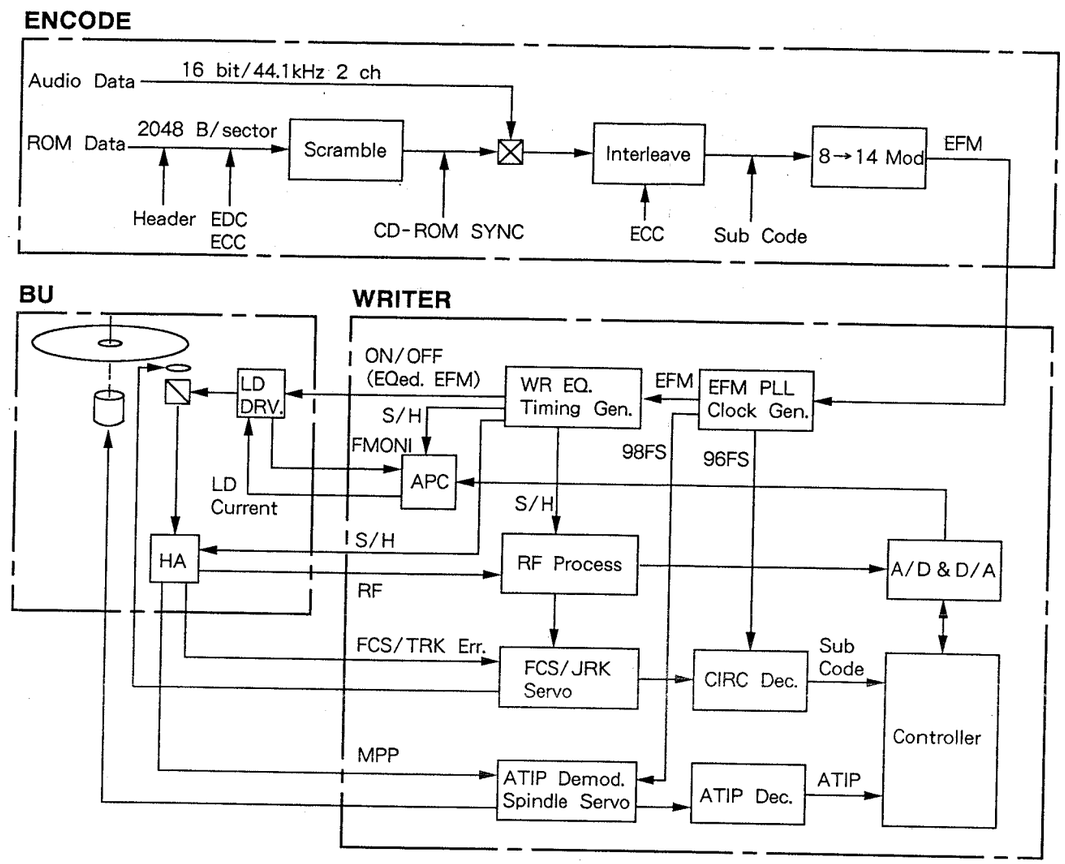


Fig 2. Functional Diagram of CDW-900E

The writer uses an EFM PLL to generate clock pulses (96 FS and 98 FS) for synchronizing the EFM signal. (The operation of the writer is based on this clock and all the writers can synchronize with a single encode. Therefore, by connecting multiple writers together, it is possible to create identical discs at the same time.) The EFM signal processed by EFM PLL is then formed by the write equalizer. The equalized EFM is transmitted to the laser driver in the base unit, and written on the disc. During write equalization, a sample hold pulse is also generated and supplied to the APC and RF signal processing circuits, and the head amplifier in the base unit. The APC circuit monitors and controls the laser output power to reduce fluctuations due to temperature changes, etc. Though this function is the same as that of a conventional CD player, performance of the APC circuit is higher in order to control laser output power more precisely for data writing.

The D/A converter controlled by the microprocessor provides the APC circuit with the value of the laser output power needed for writing. The RF signal processing circuit processes the RF signal during writing and reading. Part of the output of the RF signal processing circuit is taken by the A/D converter and utilized by the microprocessor. The focus and tracking servo circuits function in almost the same way as those of a conventional CD player, despite having a more complicated structure. Each includes a circuit which corrects unevenness in the amplitude of the focussing or tracking error signal caused by different discs. The ATIP demodulation circuit and ATIP servo circuit are unique to the CD-R recorder. They read the pre-groove signal, and operate the spindle servo accordingly. Because the CDW-900E has a CIRC decoders for CDs as well as an ATIP decoder, it can play back conventional CDs. The control microprocessor uses these decoders to obtain addresses from the disc.

3-3. EFM SIGNAL RECORDING/PLAYING BACK

Figure 3 shows how the EFM signal input to the writer block is used for recording and playback.
The input EFM signal has a period from 3T to 11T for a " 1 " pulse or a " 0 " pulse. A process called " write equalization " trims 1T from a " 1 " which lasts from 4T to 11T, and trims (1T - α) from a " 1 " which lasts 3T. The laser output power is switched to high while the equalized EFM signal is " 1 "; the heat produced by this action changes the recording layer of the medium and forms a pit.

As indicated in Figure 3, a pit continues to become larger even after the laser output power decreases, because heat remains on the disc. This is a characteristic of the CD-R medium. To correct this error, write equalization is required. On the other hand, although the " 0 " period of the equalized EFM signal is not used for forming pits, the laser is not completely turned off during this period. The laser output power is maintained at the same level as during reading in order to obtain the servo signals.

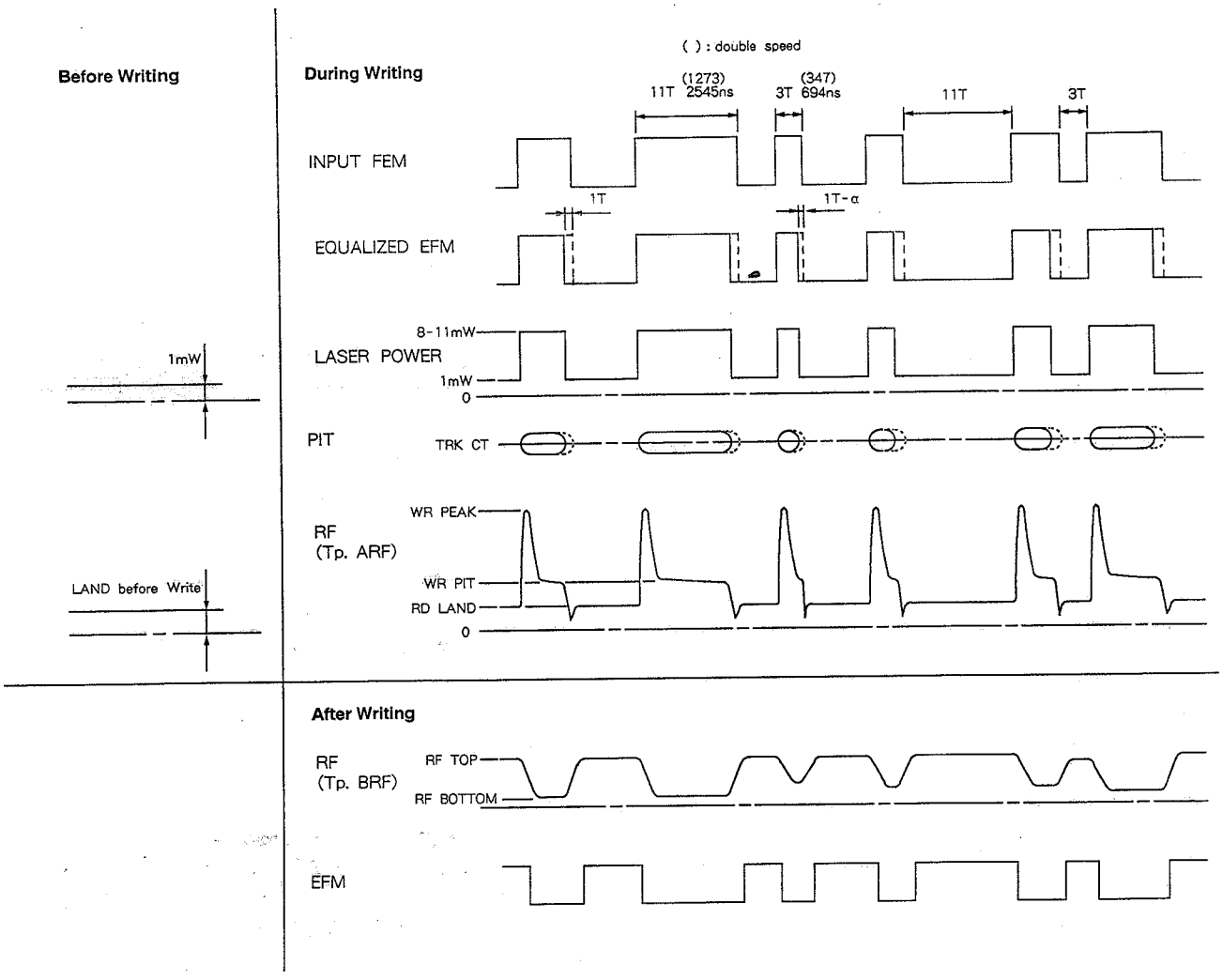


Fig 3. Relation between EFM & RF

Pits are formed one by one on the medium as described above by switching the laser output power high. Therefore, the RF signal which shows the intensity of reflected light has successive peaks as shown in the figure. The details are as follows :

Before it starts writing data, the laser is emitting light at reading intensity (approx. 1 mW). There is no pit on the disc, and the surface has a high reflectivity. Therefore the RF level is determined by the laser output power and the land reflection ratio. This level, labelled RF LAND in the Figure 3, is the same as RF TOP during reading. If the laser output power is increased for writing data, the RF signal rises momentarily to the level labeled WR PEAK, which is determined by the land reflection ratio and the writing intensity (equivalent to an output power of 8 to 11 mW), until the pit starts to form. When the pit starts to form, the reflection ratio on the medium decreases and the RF signal suddenly falls to the level labeled WR PIT, which is determined by the pit reflection ratio and the writing intensity. While the pit is forming, the WR PIT level is maintained. When the data (equalized EFM signal) to be written is " 0 " , the laser returns to reading intensity. However, the pit is still growing, for the reason described above. Therefore, the RF signal momentarily falls to the level determined by the reflection ratio of the pit and the reading intensity - this level is almost the same as RF BOTTOM during reading - but then it returns to the RD LAND level (the level before writing) when the optical spot reaches the land part.

The RF signal, as explained, varies every time a pit is formed. While data is being written on the disc, these operations are repeated continuously. Figure 4 shows the appearance on an oscilloscope of the RF signal during writing.

Conventional CD servo systems do not work well while data is being written, because the laser output power and the ratio are too high, and the RF signal varies intensely for a short period as explained. However, as Figure 3 shows, the RF signal level during writing, in the period when the EFM signal is " 0 " (RF LAND), is almost the same as the level during reading. Therefore, the CD-R writer obtains the servo error signals it needs while writing by sampling and holding the reflected signals in synchronization with the EFM signal. This is why the laser emits light at reading intensity while pits are not being formed.

To play back data recorded on the disc, the laser outputs at reading intensity and traces the lines of pits and lands. Because the laser output is constant, the RF signal level only depends on the different reflectivity of the pits and lands. As Figure 3 shows, it is high at lands and low at pits. The EFM signal is obtained, as the lower part of the figure shown, by slicing at the center of the RF signal amplitude. The " 0 "'s and " 1 "'s of this signal are inverted in comparison with the EFM signal which was input. However, because the EFM signal has the characteristic that the rising and falling edges are logic " 1 "s and the others (places where level " 1 " or " 0 ") are logic " 0 "s , the EFM signal which was input is correctly recorded on the disc. Figure 5 shows the RF signal which is observed on an oscilloscope when the recorded disc is played back. This is the same signal which is obtained when playing back a conventional CD. That is to say, it is possible to play the recorded disc back on a conventional CD player.

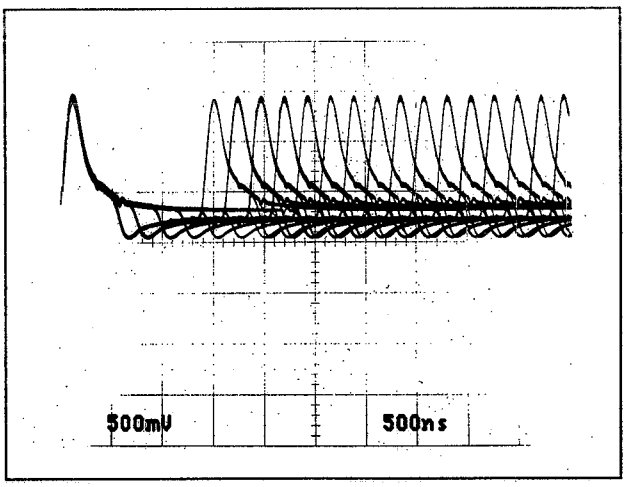


Fig 4. RF signal during writing

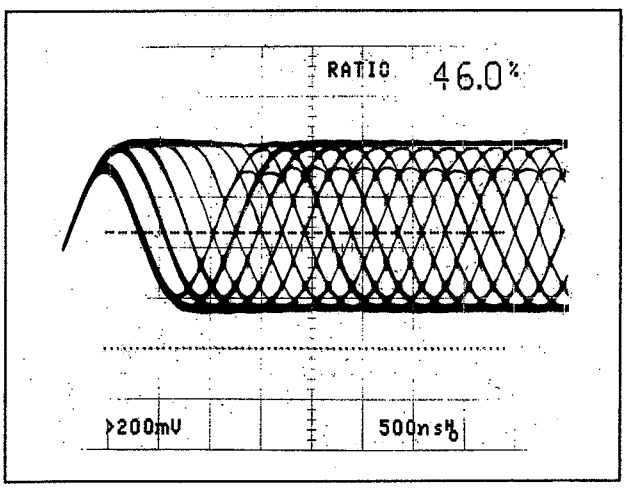


Fig 5. RF signal recorded disc is played back

3-4. MAINTAINING OPTIMUM RECORDING POWER

The pits in a CD-R medium are formed by laser heat. The intensity of the laser beam during writing affects the condition of the pits especially 3T pits and thus the quality of the recording. To make a high quality recording (with small jitter, and the lowest possible error late), the laser power must be controlled precisely. It has already been mentioned that test writing is performed before data is actually written using the PCA on the disc. This section describes test writing in detail.

Figures 6 to 8 show the RF signals when a disc recorded using different laser output powers is played back. Figure 6 shows the signal when data is written slightly under power, Figure 7 shows the signal when data is written at the optimum power, and Figure 8 shows the signal when data is written slightly over power. The lower dotted line of each picture shows the reference point (ground) of observation, and the upper lines show the center of the eye patterns to be sliced. These pictures indicate that the asymmetry of the eye pattern of the recorded disc depends on the laser output power during writing. The CD-R recorder uses this phenomenon to obtain the optimum power for recording. First, the CD-R recorder writes dummy data to the PCA with a range of laser output power values. It then detects the place where data is written most clearly, using the asymmetry detection circuit located in the RF signal process block, and actually starts writing data on the other places with that optimum intensity.

Further, the CDW-900E monitors the writing condition during writing using the RF signal detection circuit located in the RF signal process block, and accurately maintains the laser at the optimum writing intensity. This process enables the CDW-900E to achieve high quality pits over the whole surface of the disc.

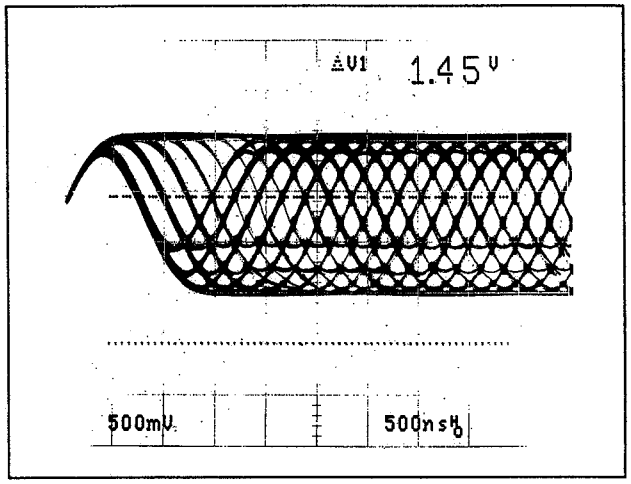


Fig 6. Slightly under power

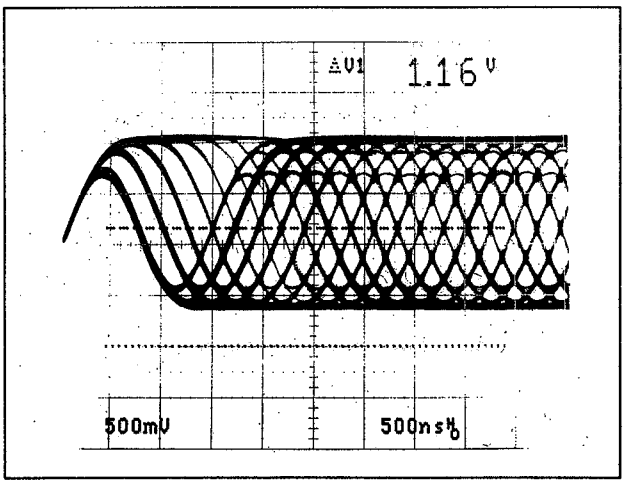


Fig 7. Most appropriate power

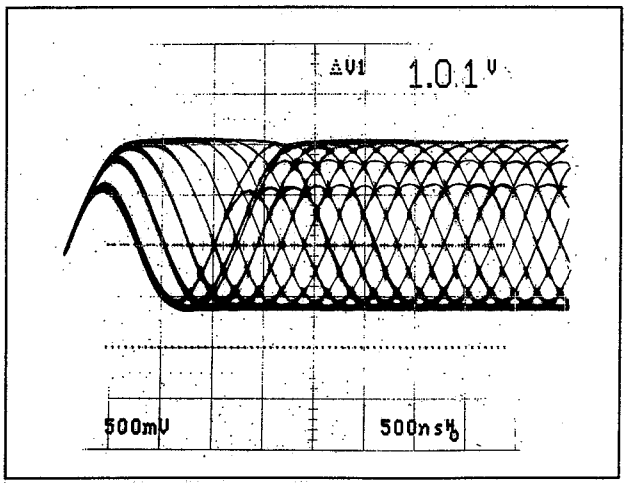


Fig 8. Slightly over power

3-5. OPERATION PROCEDURE OF EACH BLOCK FROM CONTROL SIDE

3-5-1. Initial Setting

Immediately after the reset sequence of the control microcomputer is complete (and prior to the memory test etc.), set up its output ports as indicated below.
The other ports do not need setting: just make sure they are not active.

WR-, WRLDON-, RDLDON-, FB_OFF, TB_OFF, NOR8 : High
WOB, FSY, FV, SPDL_STRT, XRST : Low

When it has finished setting itself, the control microcomputer turns the XRST of the above output ports high, and sets up the required analog circuit IC.

Note 1 : The mnemonics ending with " - " and beginning with " X " are " low " active. Others are " high " active.

Note 2 : " / " in the middle of a mnemonic indicates that the functions in front of the slash and after the slash depend on whether the signal is high or low.

3-5-2. RF block

3-5-2-1. Switching Operation Mode

The following six switches, classified in three groups, switch the operation mode.

- Writing mode switches - - - - - - - BFWR, AFTWR, WR-
- Spindle rotation speed switch - - - DBL -
- Other supplementary switches - - - PGM/PCA-, SRCH/PLY-

The following shows the functions of each group.

(1) Writing mode switches
BFWR is set to active if the disc is not written. AFTWR is set to active if the disc is already written. WR- is set to active while the disc is being written. BFWR and AFTWR are high active. WR- is low active.

(2) Spindle rotation speed switch
When data is read or written in double speed mode, DBL- is low. This switch changes the servo circuit of the spindle at the same time.

(3) Supplementary function switches

PGM/PCA- : Switches the response of the laser control circuit according to the disc program area and power calibration area. " High " is set to the program area, and " low " is set to the power calibration area.

SRCH/PLY- : Turns the laser control on / off depending on the reflected beam. While focus searching, the reflected beam intensity is not constant, therefore, this is set to the SRCH side (high). While reading and writing, it is set to the PLY side to control the laser output depending on the reflected beam and to decrease the fluctuation in disc reflectivity.

WRLDON- : The write output of the laser is activated. When this is low.

RDLDON- : The read output of the laser is activated. When this is low.

3-5-2-2. Spindle starting up procedure

1. DBL is set according to the required spindle rotation speed.
2. The gain of the spindle servo circuit is set according to the disc diameter and the spindle rotation speed.
3. BFWR is set to " H ", PGM/PCA to " H " and SRCH /PLY to " H ".
4. RDLDON- is set to low to activate the laser.
5. The focus servo is activated.
6. The tracking servo is activated.
7. If the recorded disc detect output RECed- is low, the disc is already recorded. Therefore, BFWR is switched to AFTWR.
8. SRCH/PLY- is switched to PLY in order to set the laser's reflected light control active.
9. The tracking gain is adjusted using the tracking AGC circuit.

3-5-2-3. Writing procedure in program area

1. The spindle is rotating in BFWR or AFTWR status.
2. The PGM/PCA is on the PGM side.
3. The desired value at writing is set to the laser control circuit using D/A0.
4. The SRCH/PLY- is set to SRCH
5. BFWR is switched to WR-.
6. WRLDON- is switched to low to set the laser write output active. (RDLDON- is still active.)
7. SRCH/PLY- is switched to PLY-.

Note 3 : Laser output power for recording is controlled by a circuit so that the reflected beam of the laser output on the RD side is constant. However, the WR side output is decided by the desired value given by D/A0. Therefore, When performing Running OPC, the control microcomputer must monitor the reflected beam level using A/D3 to A/D6 and adjust the desired value of the laser writing output so that A/D4 or A/D5 (11T pit) levels against A/D3 (land) or A/D6 (peak) are within the designated range.

Note 4 : It is possible to monitor the focus condition when writing with WRFOK.

3-5-2-4. Power calibration guide

1. PGM/PCA- is switched to PCA-, and data is written in the same way as described in Section 3-5-2-3 (steps 1 to 7).
2. The desired value of the write output provided from D/A0 varies every time the frame sink of ATIP is detected. (The frame addresses and corresponding desired values are memorized.)
3. When the required number of frames are written, WRLDON- becomes high to avoid overwriting, and WR- is switched to the AFTWR status.
4. After returning to the frame where writing was started, data is played back while monitoring ASY0 and ASY1.
5. When both ASY0 and ASY1 find a properly recorded area the desired value corresponding to the frame address provides the most appropriate laser output. Version E or later uses the L and H change points of ASY0 as the 1.4 m/s medium's most appropriate asymmetry, and the L and H change points of ASY1 as the 1.2 m/s medium's most appropriate asymmetry.

Note 5 : When the laser output is too large, ASY0 = H and ASY = L. When the laser output is too small, ASY0 = L and ASY = H. If the most appropriate power is not achieved, the desired value is corrected and the procedure described above is repeated.

3-5-3. Focus/Tracking Servo Block

3-5-3-1. Tracking AGC operation procedure

1. BFWR and AFTWR are set as descibed in section 3-5-2-1 (the disc is written or not.)
2. The control code is transmitted to CXA-1372 to turn the tracking off.
3. DSCHG is set to high to clear the tracking peak hold circuit.
4. DSCHG is reset to low to hold the p__p amplification of the tracking error.
5. AGC comparator outputs AGC0 and AGC1 are monitored, and

   if AGC0 = H and AGC1 = H, go to 6
   if AGC0 = L and AGC1 = L, go to 7
   if AGCO = L and AGC1 = H, go to 8.

6. The gain is low. The gain is increased using AGCCK and AGCDT, and the program returns to 3.
7. The gain is high. The gain is decreased using AGCCK and AGCDT, and the program returns to 3.
8. The gain is appropriate. The control code is transmitted, and the tracking is switched on.

3-5-3-2. Controlling sled amplification circuit and supplementary circuit

SDGUP : When this is high, the sled amplification circuit gain increases.
When this is low, the sled amplification circuit gain becomes normal.

DFCTON : When this is high, the anti-defect circuit becomes active.
When this is low, the anti-defect circuit becomes inactive.

Note 6 : When DFCTON becomes low, BFWR, AFTWR or WR- is switched. After switching, DFCTON is reset to high.

FB__OFF : When this is high, the focus bias is turned off.
When this is low, the focus bias is added.

TB__OFF : When this is high, the tracking bias is turned off.
When this is high, the tracking bias is added.

Note 7 : FB__OFF and TB__OFF are used to turn the focus and tracking bias off until the focus is activated and the spindle starts up.

3-5-4. Spindle Servo and ATIP Playback Block

3-5-4-1. Spindle starting up procedure

1. The spindle is stopped and switches WOB, FSY and FV are all low.
2. Spindle startup control input SPDL_STRT is low.
3. DBL- is set according to the required spindle rotation speed.
4. The spindle servo circuit gain is set according to the disc diameter and spindle rotation speed. The following shows the switches corresponding to disc diameters and rotation speeds. No two switches must be high at the same time.

   NOR8 : Normal speed and 8 cm disc
   NOR12 : Normal speed and 12 cm disc
   DBL8 : Double speed and 8 cm disc
   DBL12 : Double speed and 12 cm disc

5. The sled is moved to the innermost track.
6. The focus servo is activated.
7. To decide the spindle rotate direction, servo mode is set to FSY and the spindle kick serial command is transmitted to CXD-2500A.
8. Servo mode is switched to FV, and the objective rotation value is provided to the FV servo circuit.
9. The program waits until the spindle reaches rotation speed in the innermost track, and startup comparator output STRT_D goes high.
10. When STRT_D goes high, FV is switched to WOB (wobble servo mode) or to FSY (Sub-code Frame Sync. servo mode).
11. After switching, the unit is controlled according to the operation procedure of relevant servo mode.

Note 8 : Startup control input SPDL_STRT or startup comparator output STRT_D are only valid when the sled is in innermost track. If using these signals to control the unit, they must be used only the sled has moved to the innermost track.

3-5-4-2. Spindle stop procedure

1. The spindle is rotating in Wobble servo mode or in Sub-code Frame Sync. servo mode.
2. SPDL_STRT goes low.
3. Servo mode is switched from WOB or FSY to FV.
4. The program waits until the FG output measured by the timer counter of the microcomputer corresponds to the spindle stop condition.
5. When STP_PD goes low, FV, WOB and FSY are switched to low.

3-5-4-3. Controlling procedure of Wobble and Sub-code Frame Sync

C/F- : Switches of the Wobble servo mode (Coarse/Fine).
Immediately after switching FV servo mode to Wobble servo mode, the C (Coarse) side (high) is set until the spindle rotation speed becomes constant, after which the F- (Fine) side (low) is set.

For information on the operation procedure and how to read frame addresses, etc., refer to the CXD-2520 specifications for Wobble servo mode, and refer to the CXD-2500A specifications for Sub-code Frame Sync.servo mode.

3-5-5. Controlling around Write Data/Clock Extraction Circuit

EFMOK : Detects output which indicates the EFM signal is input, and becomes high when the corresponding encode board or external encode transmits the EFM signal. As mentioned above, because the analog circuit on this board does not operate correctly when there is no EFM signal being input, do not make other servo circuits active if this output is low.

ENCON- : When this is low, the corresponding encode board is active.
When this is high, the corresponding encode board stops operating. Therefore this board is controlled by an external encode.

EFMLOCK- : When EFM PLL is locked, this is L.
This board does not operate correctly unless EFMPLL is locked with EFM which is input.

SEARCH : This is a control signal which makes EFM PLL pull in.
When the EFM speed input to the Writer is changed or the power is switched on, pulling-in is necessary because EFM PLL is unlocked.

3-5-6. Others

After resetting or switching the speed, EFM PLL is pulled in.

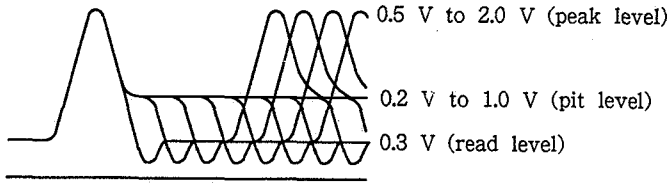
SECTION 4
CIRCUIT DESCRIPTION

4-1. RF BLOCK

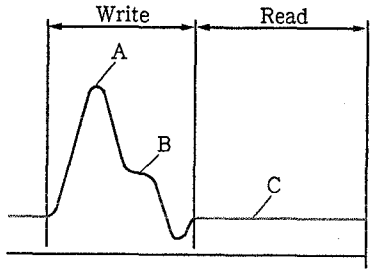
Waveform

The following waveform is observed at test point ARF during writing :

(a) At writing



One pulse wave from this group is shown in the following graph :



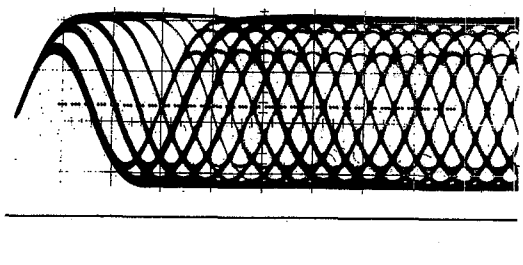
Point A : RF peak level just after the laser outputs Write power. This level is sampled and the sampled value is output to the A/D CONVERTER as PEAK (0.5 V to 2.0 V).

Point B : RF pit level when the laser outputs Write power and a Pit is being recorded on the disc. This level is sampled and the sampled value is output to the A/D CONVERTER as PIT (0.4 V to 2.0 V).

Point C : RF land level when the laser outputs Read power.
This level is sampled and the sampled value is output to the A/D CONVERTER as LND 1.62 V.

(b) At reading

The following wave form is observed at test point BRF while reading data.
The writer reads before writing data in order to recognize disc types (written or unwritten). At that time, the RF peak level is sampled and the sampled data is output to the A/D CONVERTER RFTOP 2.3 V. Also the sampled data at the bottom of the RF is output to the A/D CONVERTER RFBTM 0.7 V to 2.2 V.



These two types of signal are muted during write.

Laser Power Control

There are two APC circuits. One of them is for Read power control and the other is for Write power control.
Read APC consists of IC103 (NJM082M), IC105 (NJM3403AM) and IC109 (NJM3403AM). In a write APC which also consists of IC103 (NJM082M), IC105 and 109, the laser power is measured by the A/D converter and the optical power control signal is sent to the APC Loop from the D/A converter.

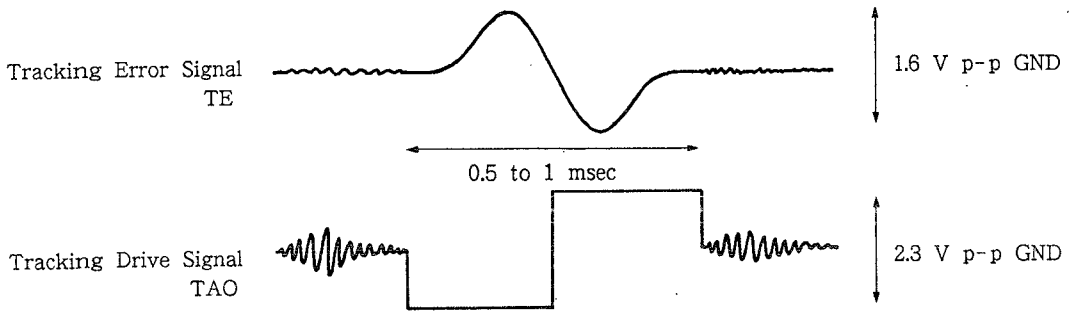
4-2. TRACKING AND FOCUS SERVO BLOCK

The tracking error signal and focus error signal are input from the MD, but there are no alterations during write since these signals are sample-held in the read portion between write pulses during write.

The tracking error signal is first input to the variable-gain amplifier IC302 (DS1267S-10), and its gain is controlled. This gain control is implemented when the spindle starts up and the output amplitude is 0.5 V p-p when the tracking is off.

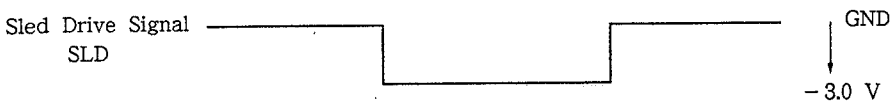
This gain-controlled tracking error signal is fed into IC303 and IC304 for phase compensation. Then the phase-compensated signal is fed into the servo signal processor IC310 (CXA1372AQ). The output signal from IC310 is amplified by IC314 and IC315, and fed into MD to drive the tracking actuater.

Here are the paused tracking error signal, and a tracking drive signal which received the pause command from the BIF.



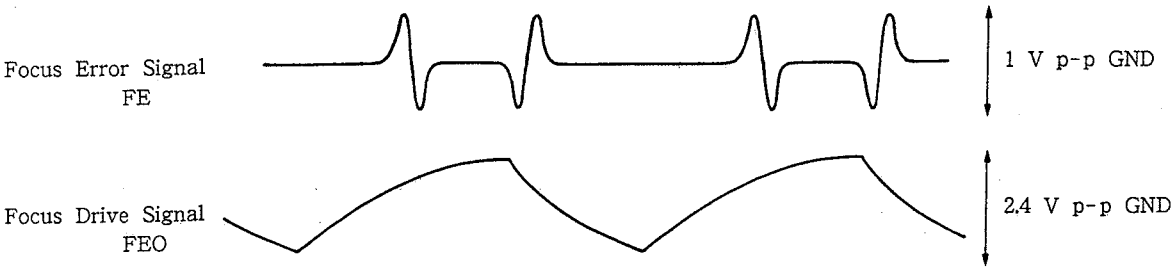
Also, the tracking drive signal output from IC310 (CXA1372AQ) passes through the lag-lead filter, is once again input into IC310, and is output as the sled drive signal. This signal is output to the MD once the current amplitude has been increased by IC316 and IC317 (LA6501).

Here is the sled drive signal when the sled signal is sent to the internal.



The focus error signal is also fed into the variable gain amplifier IC302, but the signal goes through without being gain-controlled. Then the signal is fed IC303 and IC310 (CXA 1372AQ), which are both for phase compensation. The output signal from IC310 is amplified by IC312 and IC313, and is fed into MD to drive the focus actuator.

Here are the focus error signal and the focus drive signal in focus searching.



4-3. SPINDLE SERVO AND ATIP BLOCK

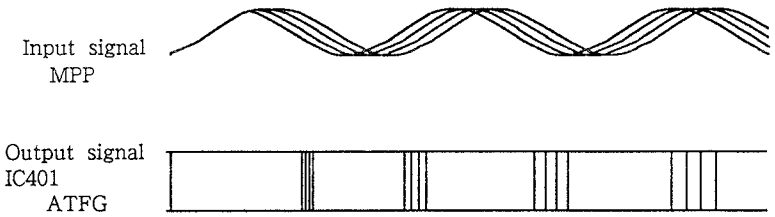
The spindle servo is also carried out in this block.

The reference clock signal of the spindle servo comes from the 3.15 kHz clock signal. This 3.15 kHz clock signal is made by dividing 8.64 MHz clock by 1372.

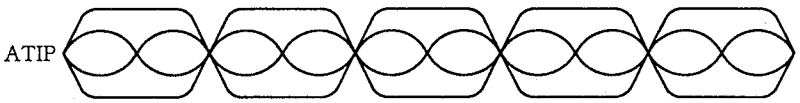
This reference signal and the wobble signal output from IC401 (22.05 kHz at normal speed, frequency-divided by 7), are input into the phase comparator IC404 (TC5081AP), and the difference signal is output to the MD through the low pass filter and the phase compensator IC411 (NJM3403).

Once extracted, the 6.3 kHz ATIP clock signal, which was regenerated with the PLL (IC401) and frequency-divided, is used as a comparison signal instead of the Wobble signal.

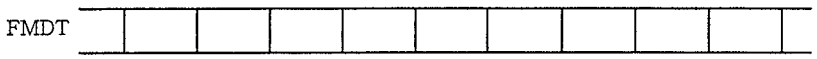
The Push/Pull signal (CNJ101, 10pin, MPP) which is output from the MD is amplified by IC411 and passes through a high-pass filter. Then the signal is put into the ATIP demodulator IC401 (CXA1380M). In this IC, the input signal first passes through the band-pass filter whose center frequencies are 22.05 kHz at normal speed, 44.1 kHz at double speed. Then the signal is compared with a certain value, and becomes a two-valued signal which we can observe as ATFG.



Since the ATFG signal contains the ATIP information, it is fed into the PLL block in this IC, and the Bi-phase data is extracted. This Bi-phase Data is observed as ATIP, as shown below.



The FMDT signal is produced by comparing the ATIP signal with a certain value.



Finally the FMDT is put into the PLL in this IC, and a 6.3 kHz clock signal is regenerated which is used for decoding data.

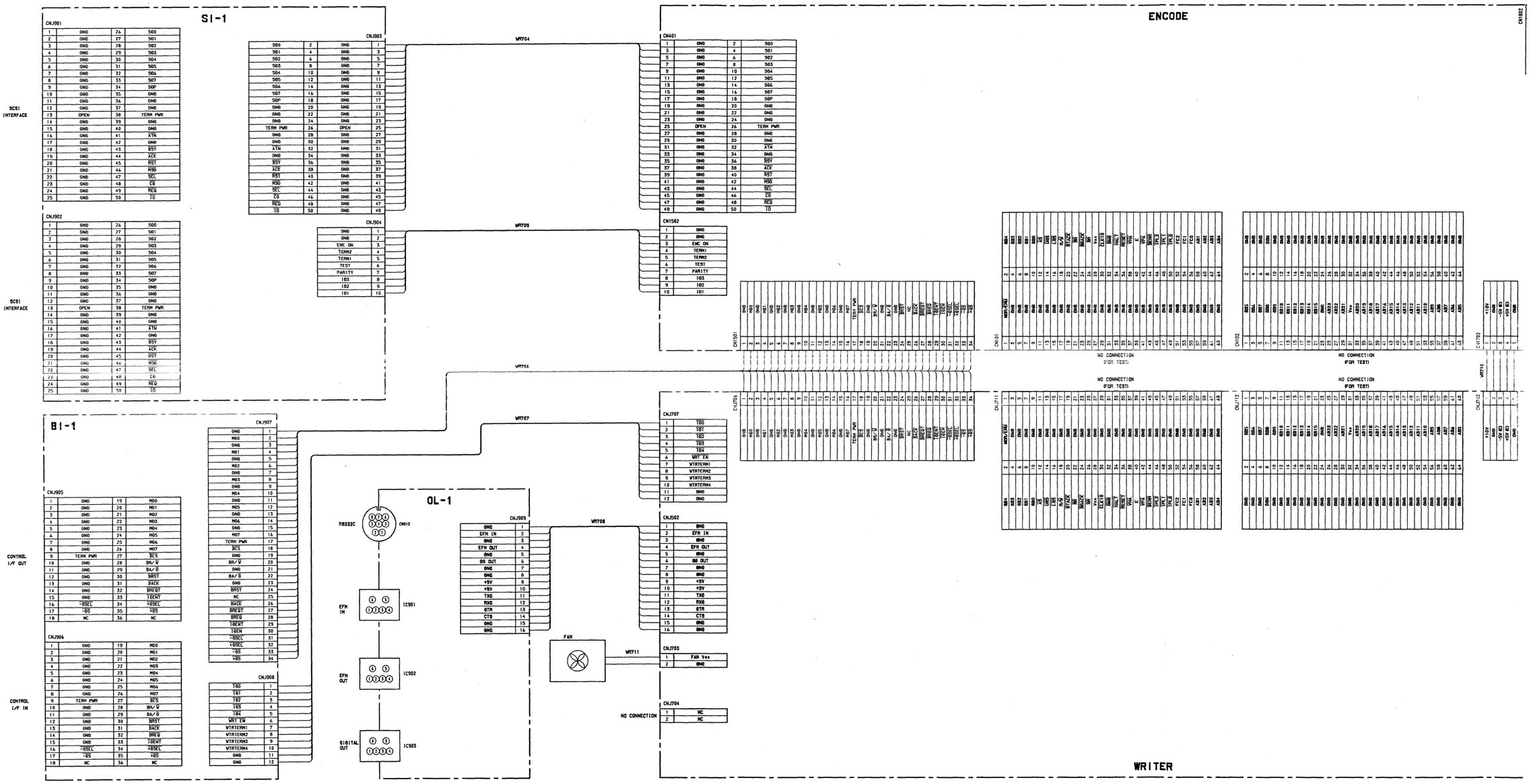
4-4. TIMING BLOCK

The EFM signal input from the external through optical fiber cable is converted to the TTL level on the TOSLINK board and is input into the writer board through CNJ502.

When the EFM signal is input, the clock signals are regenerated from IC510 (SN74HC00ANS), IC503 (2T35-100), IC521 (SN74HC00ANS), IC504 (PEEL18CV8) and IC520 (NJM3403A).
The clock signal which is regenerated (SFTCLK) and EFM signal (SFTEFM), are synchronized by EFM PLL.
The clock and EFM signals which are output from PLL are put into the data converter consisting of IC506, IC507 and IC508 (SN74HC164ANS), IC509 (PEEL18CV8), IC510 (PEEL 22CV10), and IC511 (2T35-50).
The EFM signal is changed to a writing signal which is converted to ECL level, and this is fed to the Base Unit.

SECTION 5
DIAGRAMS

5-1. FRAME HARNESS



ENCODE

CN401			
1	GND	2	S00
3	GND	4	S01
5	GND	6	S02
7	GND	8	S03
9	GND	10	S04
11	GND	12	S05
13	GND	14	S06
15	GND	16	S07
17	GND	18	SBP
19	GND	20	GND
21	GND	22	GND
23	GND	24	GND
25	OPEN	26	TERM PWR
27	GND	28	GND
29	GND	30	GND
31	GND	32	ATN
33	GND	34	GND
35	GND	36	BSY
37	GND	38	ACK
39	GND	40	RST
41	GND	42	MSG
43	GND	44	SEL
45	GND	46	C/D
47	GND	48	REQ
49	GND	50	I/O

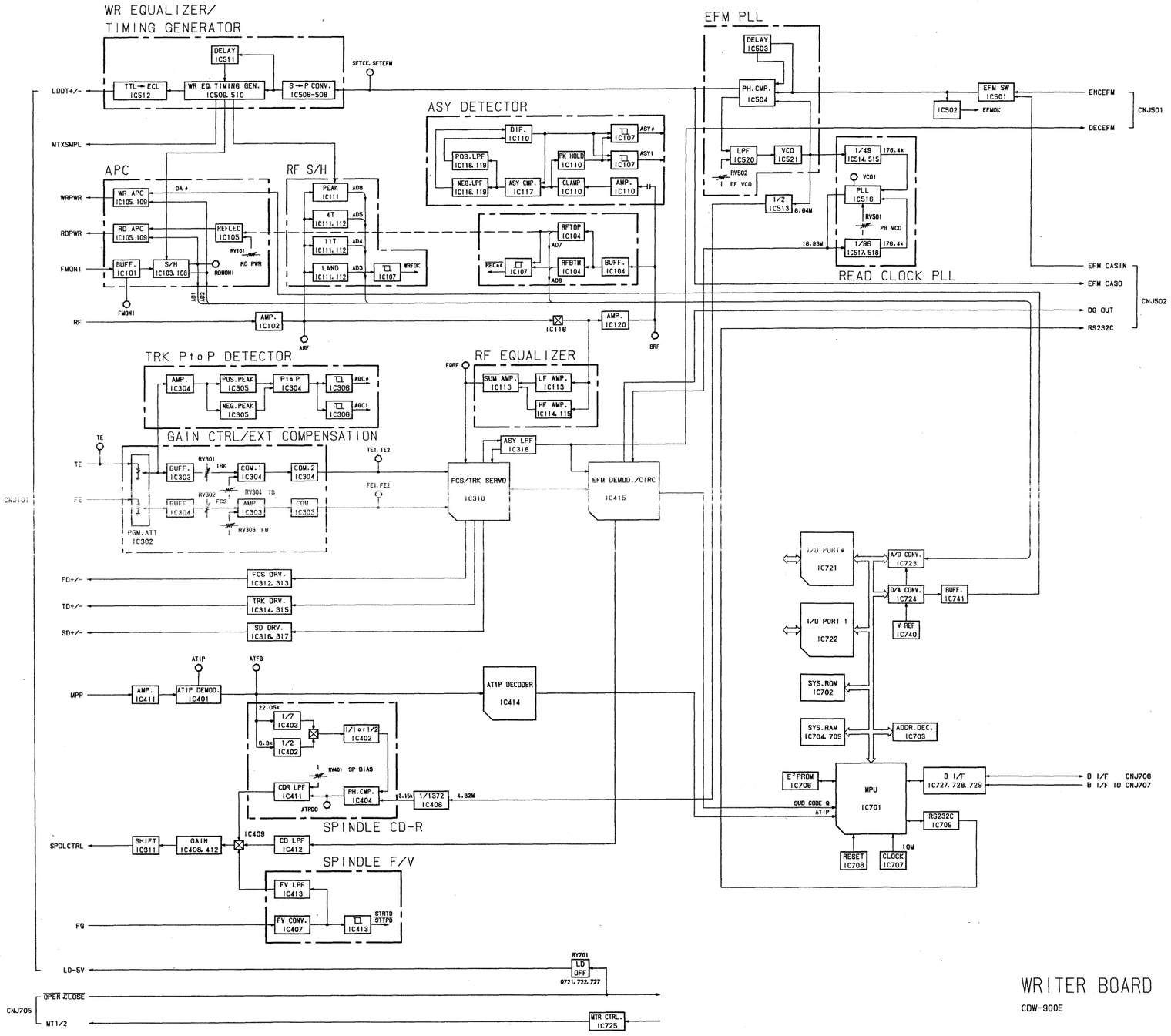
CN1502	
1	GND
2	GND
3	ENC ON
4	TERM1
5	TERM2
6	TEST
7	PARITY
8	10S
9	10Z
10	10I

CN501 — GND, GND, FGND, MSI, GND, MSO, GND, MSG, GND, MSC, GND, MSD, GND, MSB, GND, MSP, TERM PWR, GND, BSY-W, BSY-R, GND, RST-R, RST-W, ACK-R, ACK-W, ATN-R, ATN-W, TGRI, TGRO, SELI, SELO, REQI, REQO

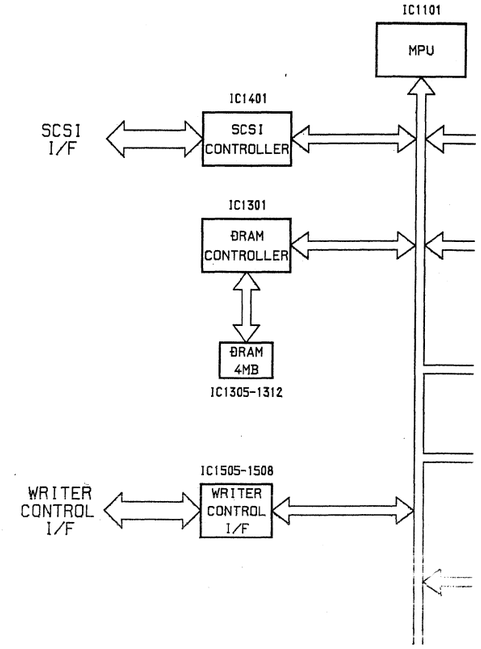
CN101 — MDRV/FGND, GND, GND, G

5-2. BLOCK DIAGRAM

5-2-1. Writer Block



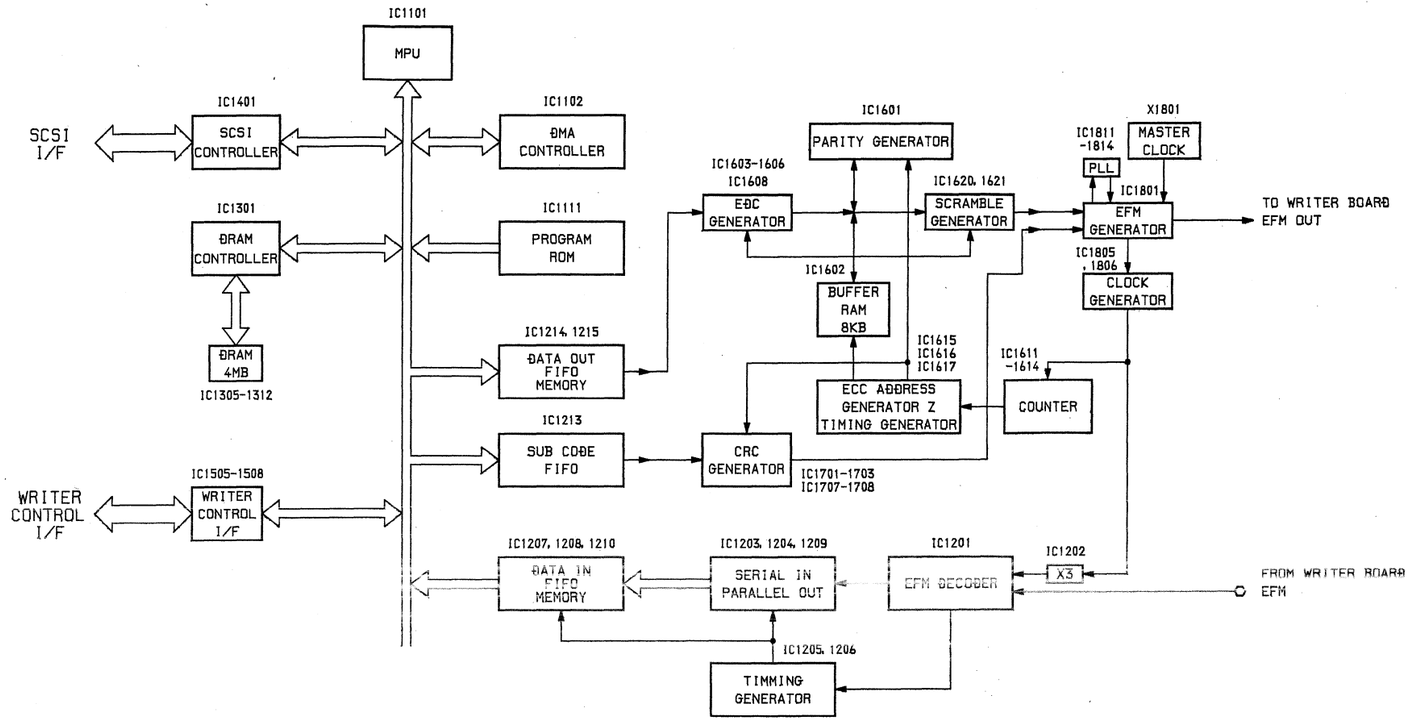
5-2-2. Encode Block



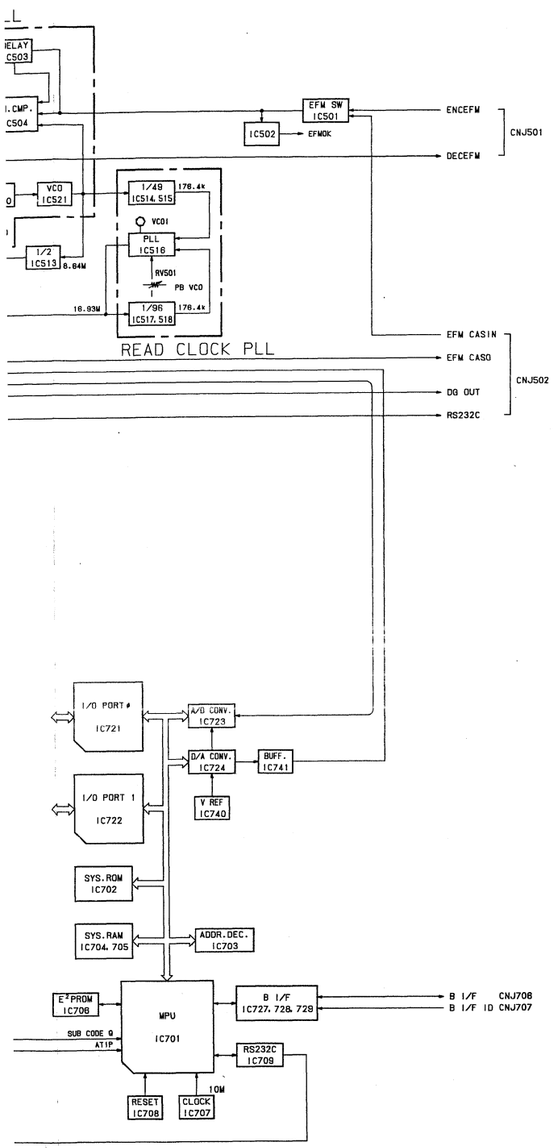
WRITER BOARD

CDW-900E

5-2-2. Encode Block



ENCODE BLOCK
CDW-900E



WRITER BOARD
CDW-900E

EXPLANATION

IATION OF WORD ON SCHEMATIC DIAGRAM

ck

)jective value of the laser output when writing.
rs the laser output when reading.
rs the laser output when writing.
eflection level when writing.
ion level of 11T pit when writing.
ion level of 4T pit when writing.
eflection level when writing.
eflection level when reading.
lection level when reading.

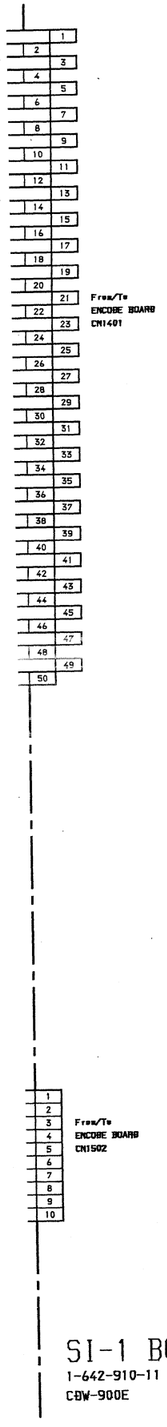
Focusing detection output when writing.
Asymmetry detection output 0.
Asymmetry detection output 1.
Recorded disc detection output.

Control input which switches the circuit operation to the condition which existed before writing.
Control input which switches the circuit operation to the condition which existed after writing.
Control input which switches the circuit operation to the condition which existed during writing.
Control input which switches to double-speed mode.
Control input which switches the circuit operation according to the program area or power calibration area on the disc.
Control input which indicates that the disc is being focus searched or is being recorded/played back.
Control input which activates the laser writing output.
Control input which activates the laser reading output.

Tracking Servo Block

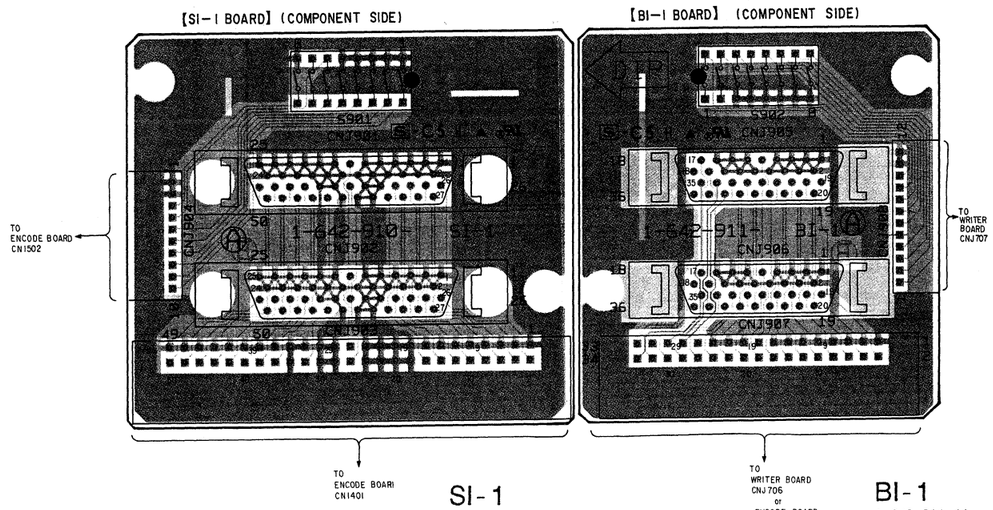
acking AGC detection output 0
acking AGC detection output 1
cusing detection output when playing back.
cal defect detection output of the disc.
rror block detection output when traversing
aversing detection output when accessing

;charging control input of the sample hold circuit for tracking AGC detection
in increment control input of the sled servo circuit
in control input of the sled servo circuit
ntrol input which turns off the focus bias
ntrol input which turns off the tracking bias
:A-1372 direct control input
ift clock input of the tracking AGC circuit
in setting data input of the tracking AGC circuit



SI-1 BOARD
1-642-910-11
CDW-900E

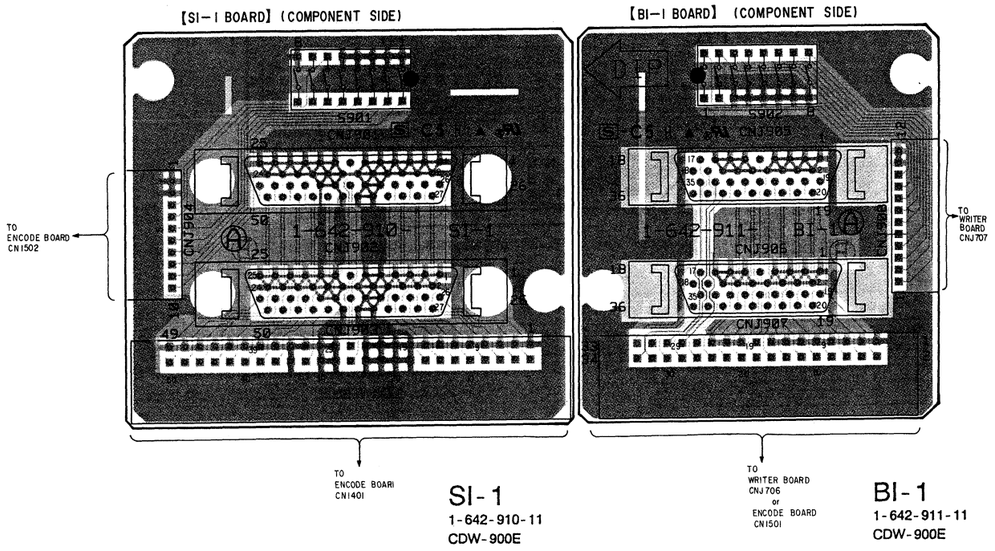
5-4-2. BI-1 Board

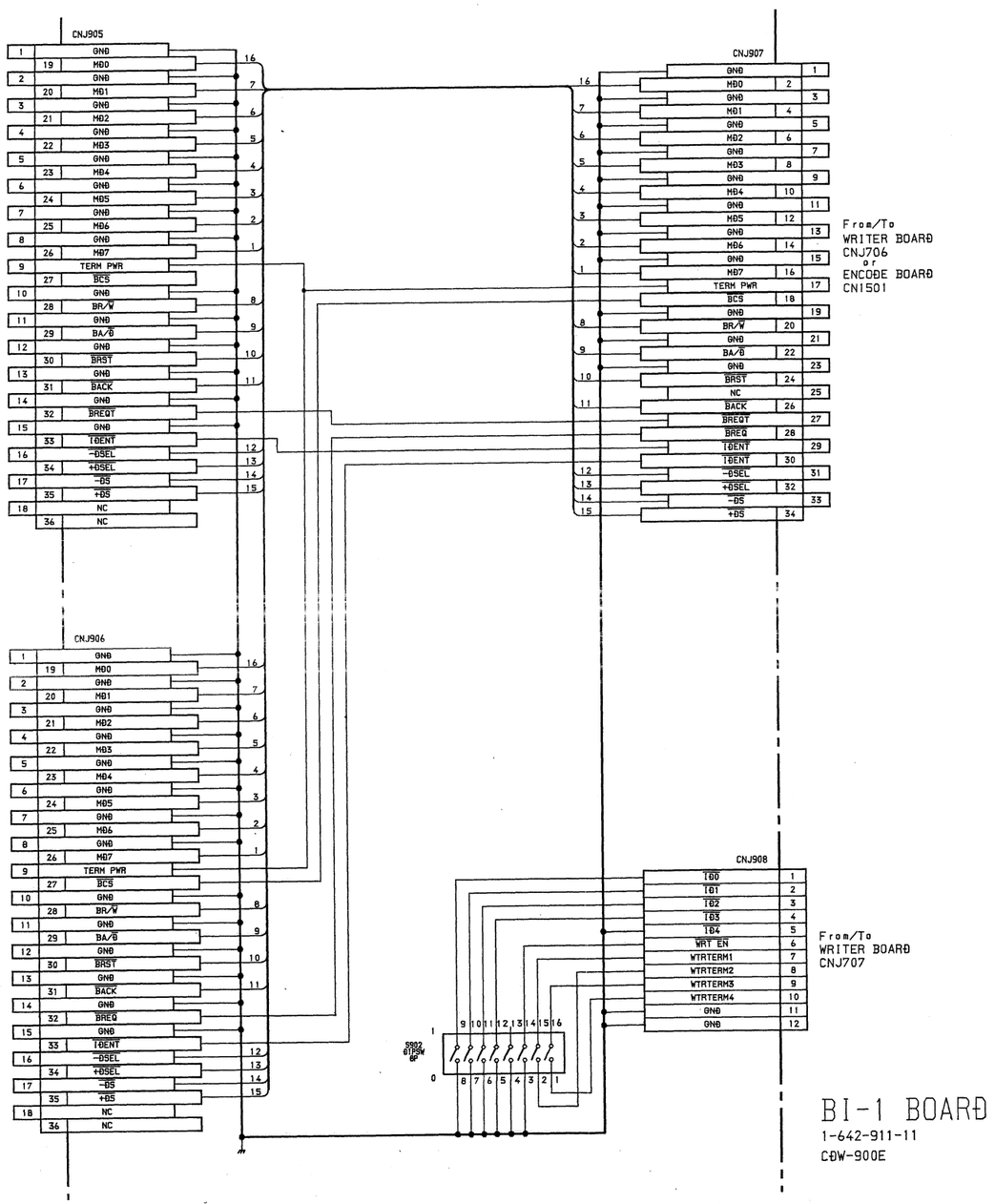


SI-1
1-642-910-11
CDW-900E

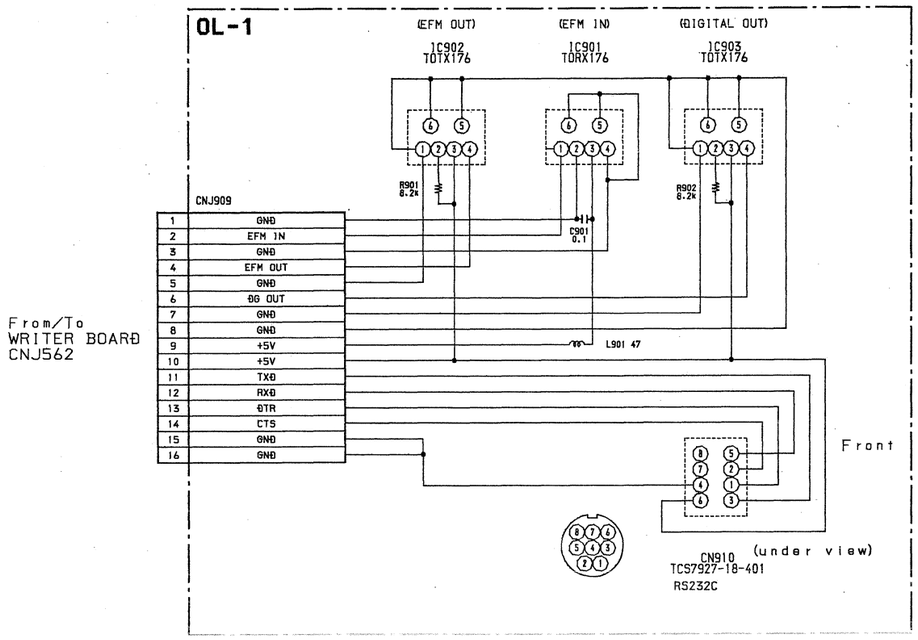
BI-1
1-642-911-11
CDW-900E

5-4-2. BI-1 Board



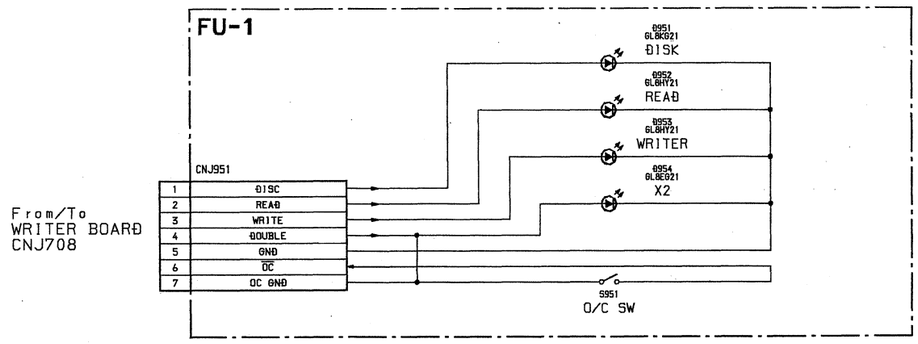

CNJ905
GND MD0 GND MD1 GND MD2 GND MD3 GND MD4 GND MD5 GND MD6 GND MD7 TERM PWR BCS GND BR/W GND BA/B GND BRST GND BACK GND BREQT GND IOENT -DSEL +DSEL -DS +DS NC NC
CNJ906
GND MD0 GND MD1 GND MD2 GND MD3 GND MD4 GND MD5 GND MD6 GND MD7 TERM PWR BCS GND BR/W GND BA/B GND BRST GND BACK GND BREQ GND IOENT -DSEL +DSEL -DS +DS NC NC
CNJ907
GND MD0 GND MD1 GND MD2 GND MD3 GND MD4 GND MD5 GND MD6 GND MD7 TERM PWR BCS GND BR/W GND BA/B GND BRST NC BACK BREQT BREQ IOENT IOENT -DSEL +DSEL -DS +DS
From/To WRITER BOARD CNJ706 or ENCODE BOARD CN1501
CNJ908
IO0 IO1 IO2 IO3 IO4 WRT EN WTRTERM1 WTRTERM2 WTRTERM3 WTRTERM4 GND GND
From/To WRITER BOARD CNJ707
S902 DIPSW 8P
BI-1 BOARD
1-642-911-11
CDW-900E

5-4-3. OL-1, FU-1, PI-1 Board



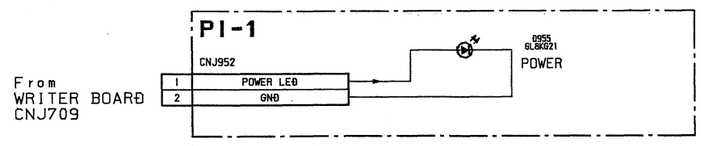
OL-1 BOARD

1-642-912-11
CDW-900E



FU-1 BOARD

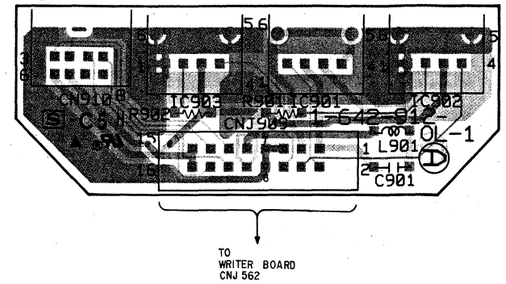
1-642-908-11
CDW-900E



PI-1 BOARD

1-942-909-11
CDW-900E

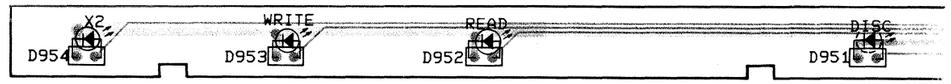
【OL-1 BOARD】 (COMPONENT SIDE)



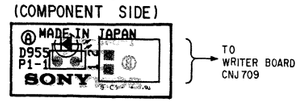
OL-1

1-642-912-11
CDW-900E

【FU-1 BOARD】 (COMPONENT SIDE)



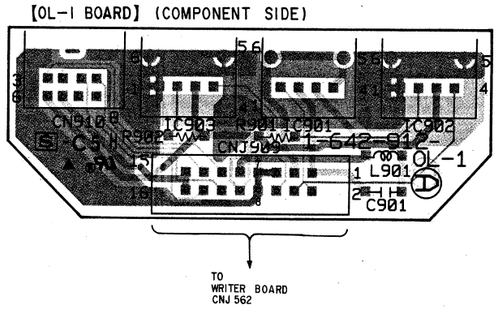
【PI-1 BOARD】
(COMPONENT SIDE)



PI-1

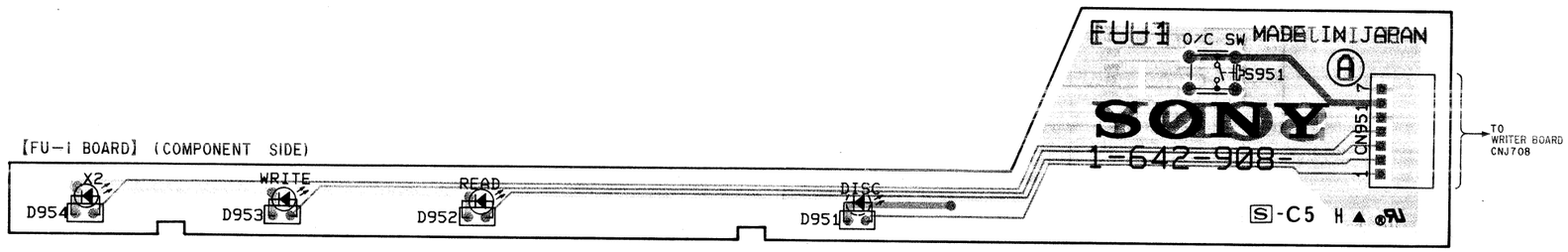
1-642-909-11
CDW-900E

【OL-I BOARD】 (COMPONENT SIDE)



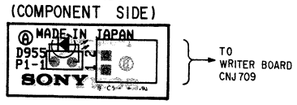
OL-1
1-642-912-11
CDW-900E

【FU-i BOARD】 (COMPONENT SIDE)



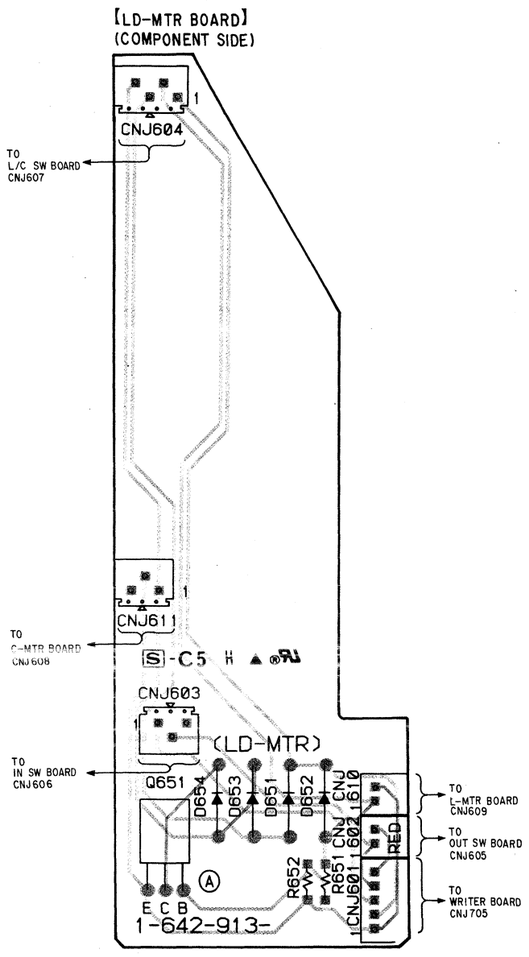
FU-1
1-642-908-11
CDW-900E

【PI-I BOARD】
(COMPONENT SIDE)

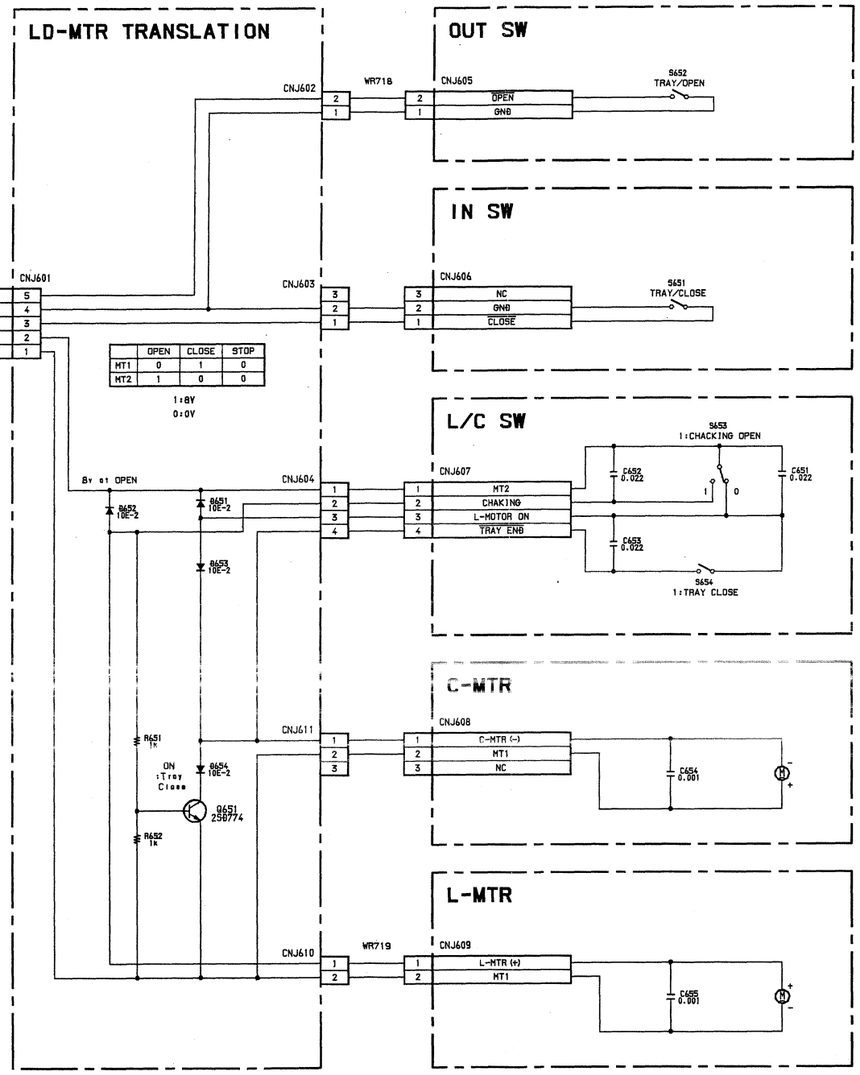


PI-1
1-642-909-11
CDW-900E

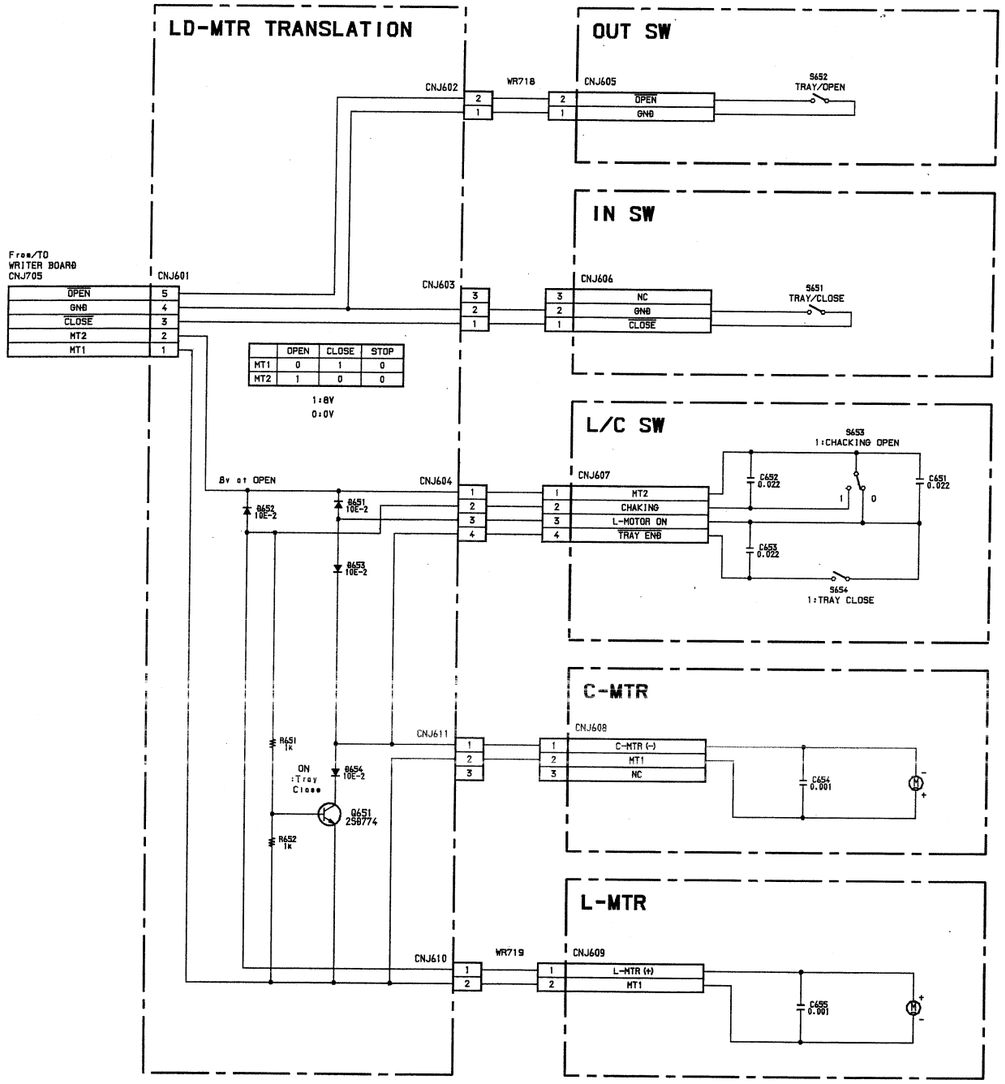
5-4-4. LD-MTR, OUT SW, IN SW, L/C SW, C-MTR, L-MTR Board



LD-MTR
1-642-913-11
CDW-900E



LD-MTR TRANSLATION
1-642-913-11
OUT SW
1-642-918-11
IN SW
1-642-917-11
L/C SW
1-642-916-11
C-MTR
1-642-915-11
L-MTR
1-642-914-11
CDW-900E



	OPEN	CLOSE	STOP
MT1	0	1	0
MT2	1	0	0

LD-MTR TRANSLATION
1-642-913-11

OUT SW
1-642-918-11

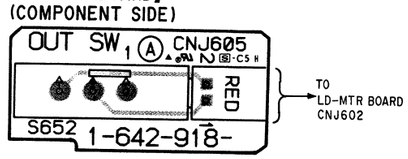
IN SW
1-642-917-11

L/C SW
1-642-916-11

C-MTR
1-642-915-11

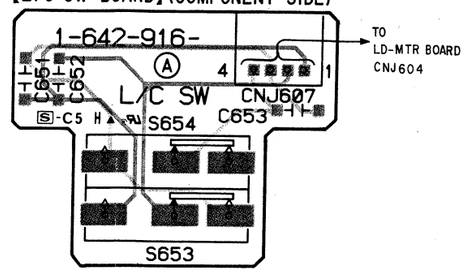
L-MTR
1-642-914-11
CDW-900E

【OUT SW BOARD】
(COMPONENT SIDE)



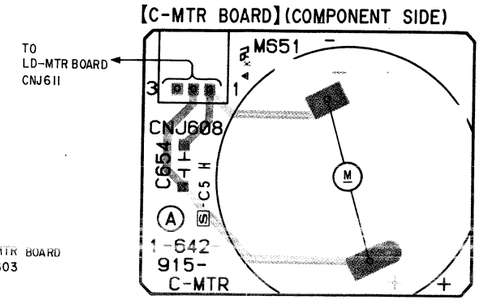
OUT SW
1-642-918-11
CDW-900E

【L/C SW BOARD】(COMPONENT SIDE)



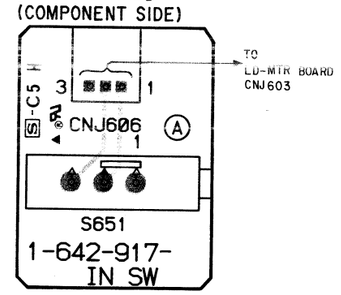
L/C SW
1-642-916-11
CDW-900E

【C-MTR BOARD】(COMPONENT SIDE)



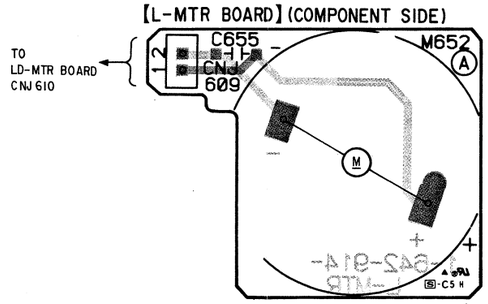
C-MTR
1-642-915-11
CDW-900E

【IN SW BOARD】
(COMPONENT SIDE)



IN SW
1-642-917-11
CDW-900E

【L-MTR BOARD】(COMPONENT SIDE)

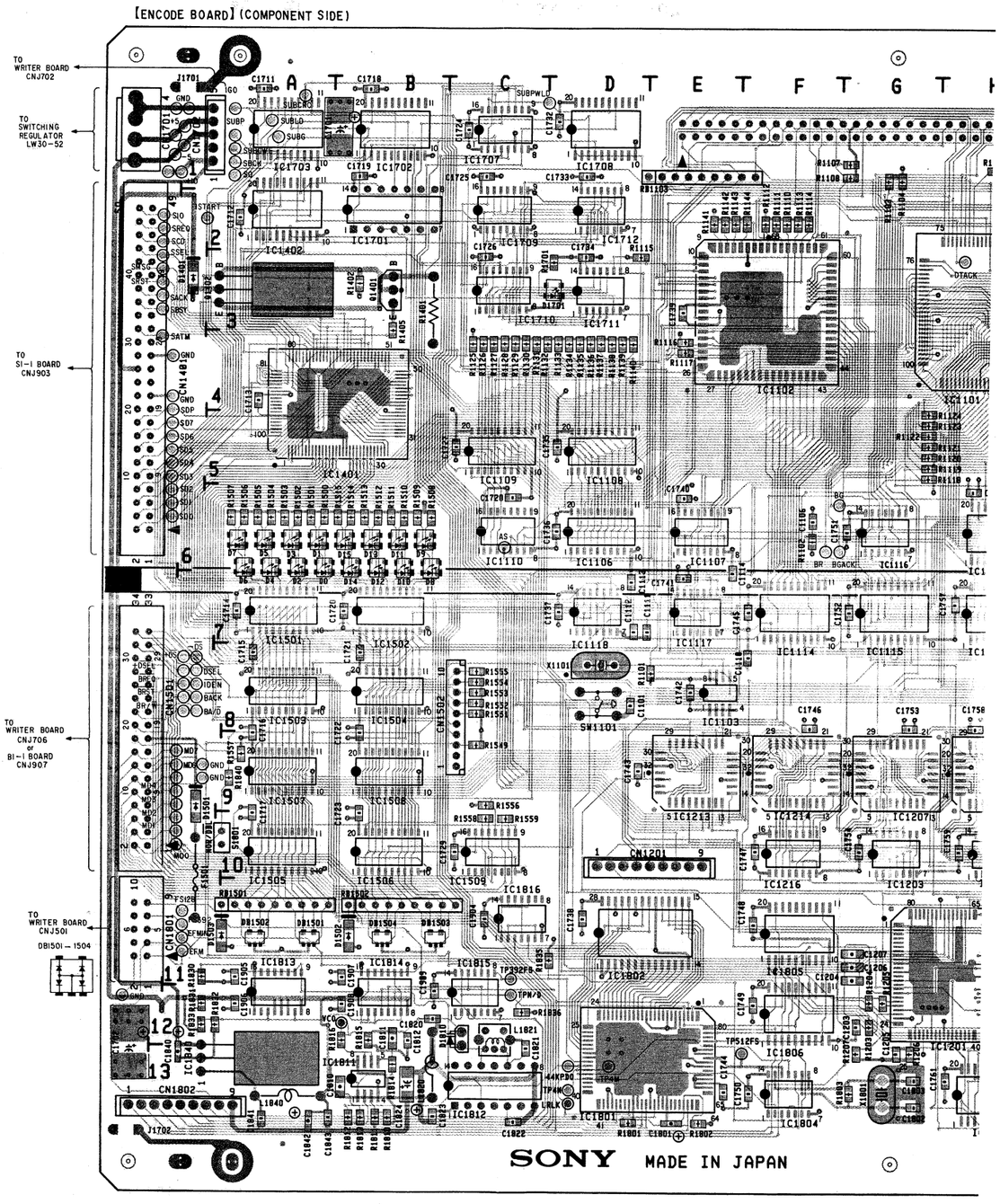


L-MTR
1-642-914-11
CDW-900E

ENCODE BOARD LOCATION

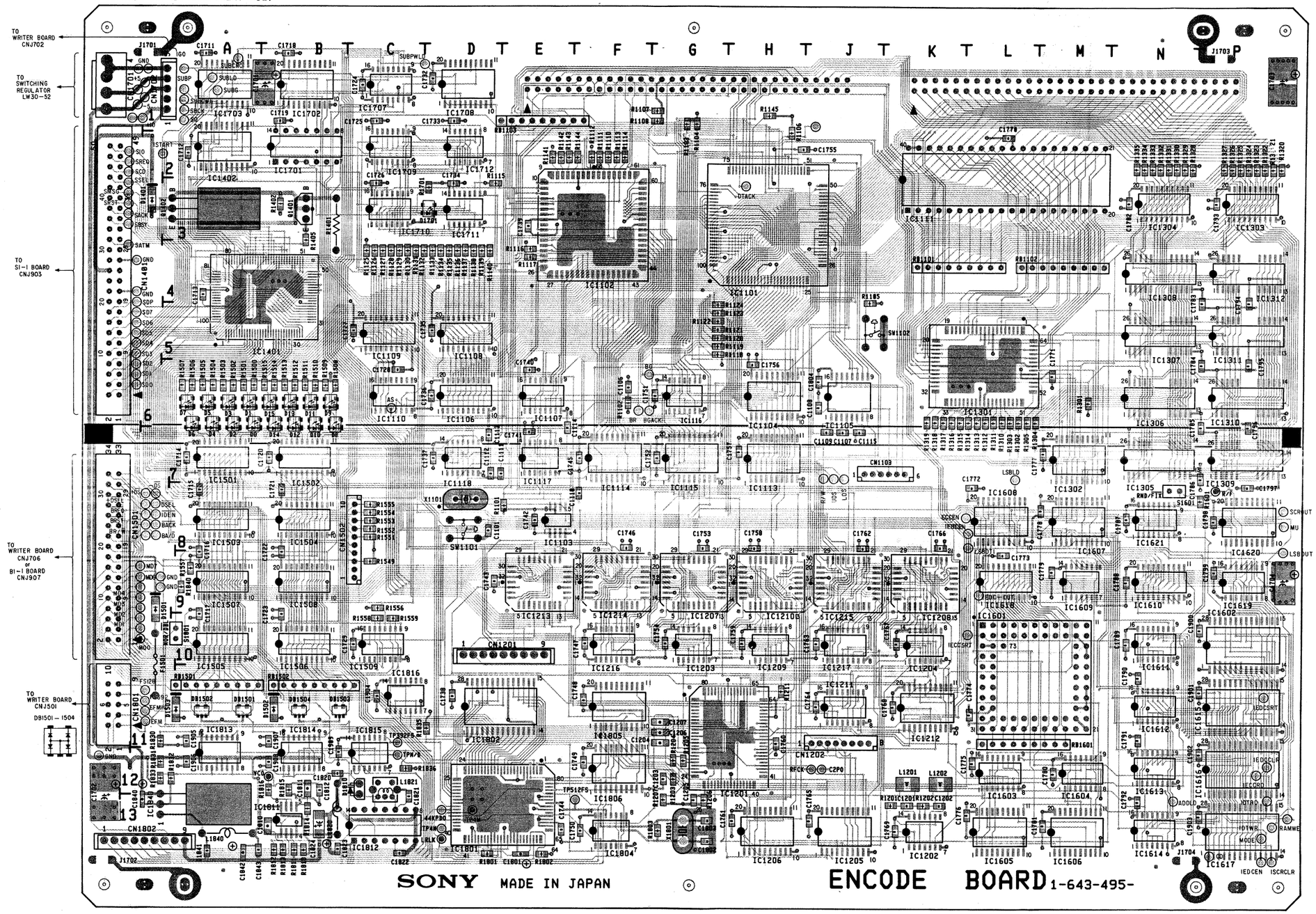
CN1103	J-7	D1810	C-12	IC1207	G-9	IC1508	B-9	IC1801	D-13
CN1201	D-10			IC1208	K-9	IC1509	C-10	IC1802	D-11
CN1202	J-11	DB1501	A-11	IC1209	H-10	IC1601	L-10	IC1804	F-13
CN1401	A-4	DB1502	A-11	IC1210	H-9	IC1602	P-10	IC1805	F-11
CN1501	A-8	DB1503	B-11	IC1211	J-11	IC1603	L-12	IC1806	F-12
CN1502	C-8	DB1504	B-11	IC1212	K-11	IC1604	M-12	IC1811	B-13
CN1701	A-1			IC1213	E-9	IC1605	L-13	IC1812	C-13
CN1702	A-1	F1501	A-10	IC1214	F-9	IC1606	M-13	IC1813	A-11
CN1801	A-11			IC1215	J-9	IC1607	M-8	IC1814	B-11
CN1802	A-13	IC1101	H-4	IC1216	F-10	IC1608	L-8	IC1815	C-11
		IC1102	F-4	IC1217	J-10	IC1609	M-9	IC1816	C-11
D0	A-6	IC1103	E-8	IC1301	L-6	IC1610	N-9	IC1840	A-13
D1	A-6	IC1104	H-6	IC1302	M-7	IC1611	N-10		
D2	A-6	IC1105	J-6	IC1303	P-3	IC1612	N-11	Q1401	B-3
D3	A-6	IC1106	D-6	IC1304	N-3	IC1613	N-12	Q1402	A-3
D4	A-6	IC1107	E-6	IC1305	N-7	IC1614	N-13		
D5	A-6	IC1108	D-5	IC1306	N-6	IC1615	P-11	RB1101	K-4
D6	A-6	IC1109	C-5	IC1307	N-5	IC1616	P-12	RB1102	M-4
D7	A-6	IC1110	C-6	IC1308	N-4	IC1617	P-13	RB1103	E-1
D8	B-6	IC1111	K-3	IC1309	P-7	IC1618	L-9	RB1501	A-11
D9	B-6	IC1113	H-7	IC1310	P-6	IC1619	P-9	RB1502	B-11
D10	B-6	IC1114	F-7	IC1311	P-5	IC1620	P-8	RB1601	M-11
D11	B-6	IC1115	G-7	IC1312	P-4	IC1621	N-8		
D12	B-6	IC1116	G-6	IC1401	B-5	IC1701	B-2	S1601	N-8
D13	B-6	IC1117	E-7	IC1402	A-2	IC1702	B-1	S1801	A-10
D14	B-6	IC1118	D-7	IC1501	A-7	IC1703	A-1		
D15	B-6	IC1201	H-12	IC1502	B-7	IC1707	C-1	SW1101	D-8
D1401	A-3	IC1202	K-13	IC1503	A-8	IC1708	D-1	SW1102	K-5
D1501	A-9	IC1203	G-10	IC1504	B-8	IC1709	C-2		
D1502	B-11	IC1204	K-10	IC1505	A-10	IC1710	C-3	X1101	D-8
D1503	A-11	IC1205	J-13	IC1506	B-10	IC1711	D-3	X1801	G-13
D1701	D-3	IC1206	H-13	IC1507	A-9	IC1712	D-2		

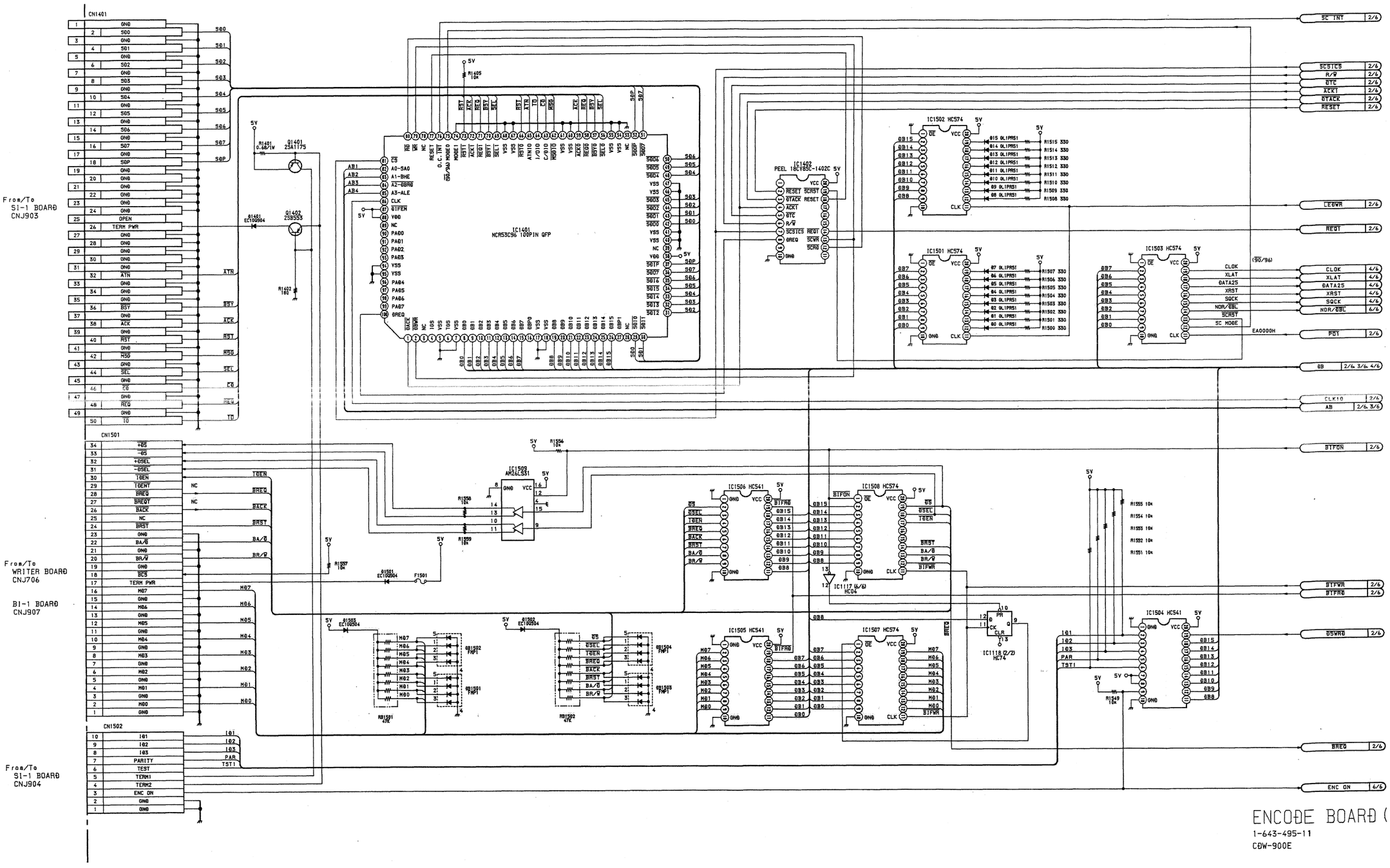
5-4-5. Encode Board


[ENCODE BOARD] (COMPONENT SIDE)
TO WRITER BOARD CNJ702
TO SWITCHING REGULATOR LW30-92
TO SI-I BOARD CNJ903
TO WRITER BOARD CNJ706 or BI-I BOARD CNJ907
TO WRITER BOARD CNJ501
DB1501 – 1504
SONY MADE IN JAPAN

5-4-5. Encode Board

[ENCODE BOARD] (COMPONENT SIDE)

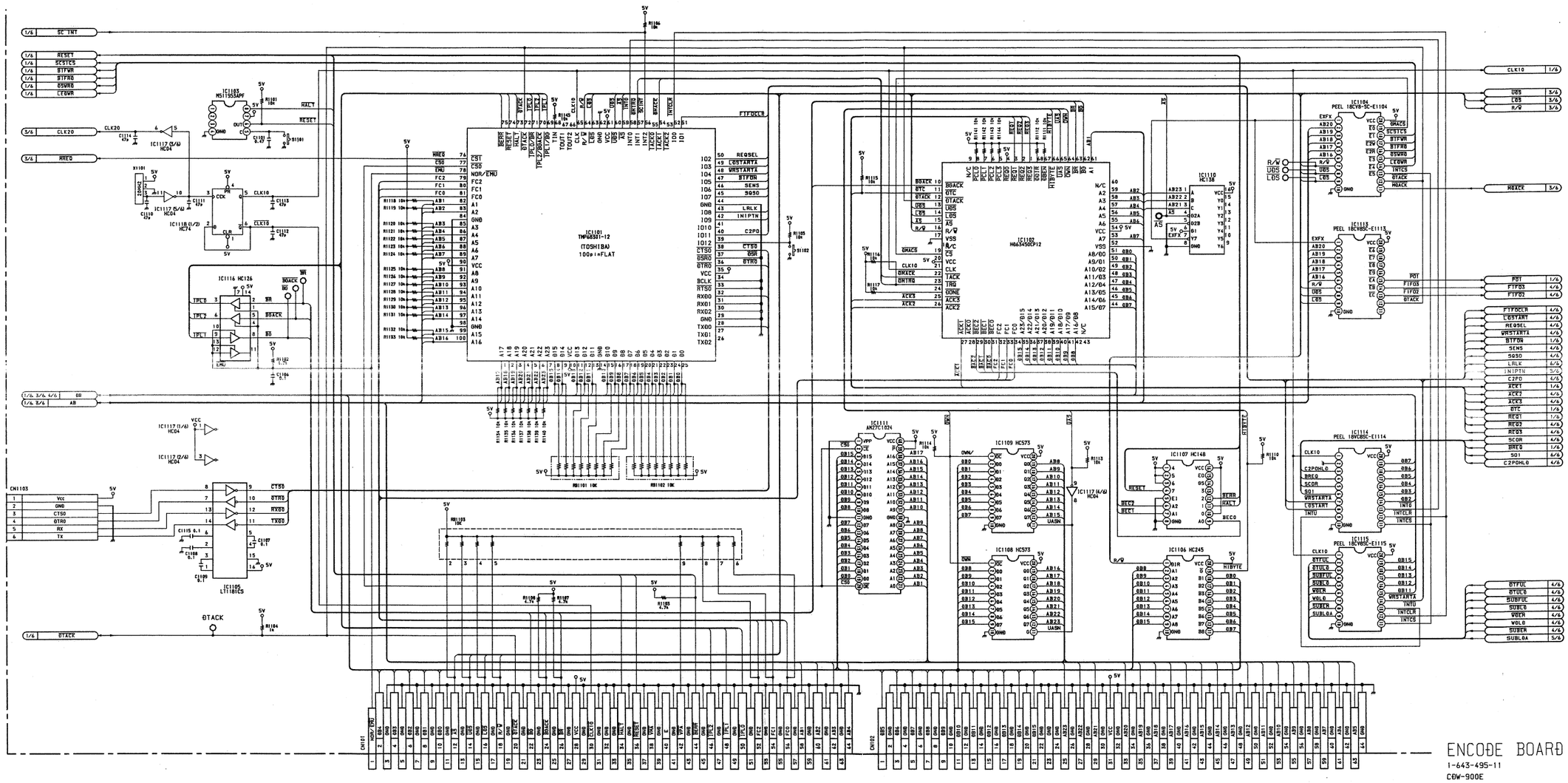

TO WRITER BOARD CNJ702
TO SWITCHING REGULATOR LW30-52
TO SI-1 BOARD CNJ903
TO WRITER BOARD CNJ706 or BI-1 BOARD CNJ907
TO WRITER BOARD CNJ501
DBI501-1504
SONY MADE IN JAPAN
ENCODE BOARD 1-643-495-

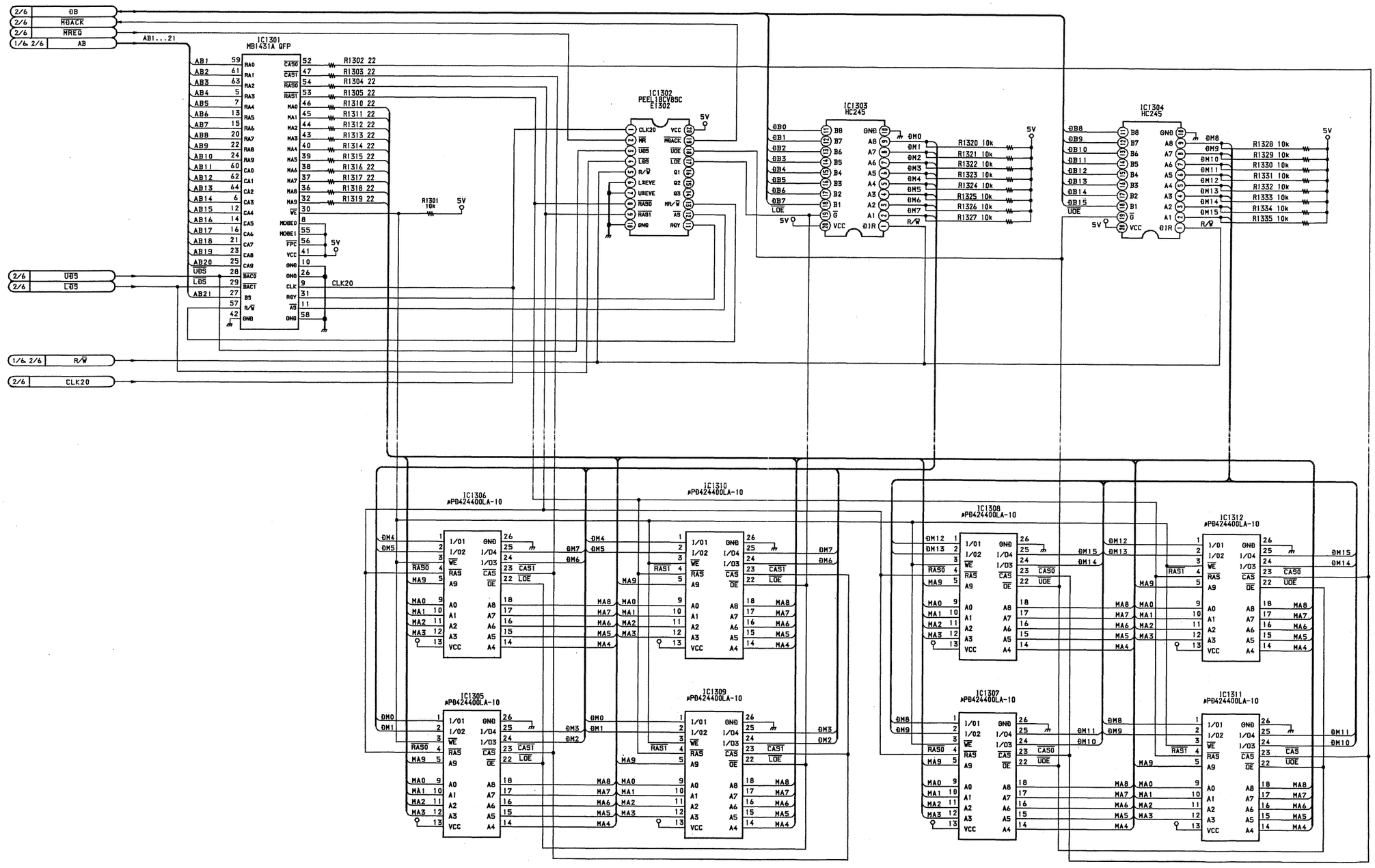


ENCODE BOARD (1/6)

1-643-495-11

CDW-900E

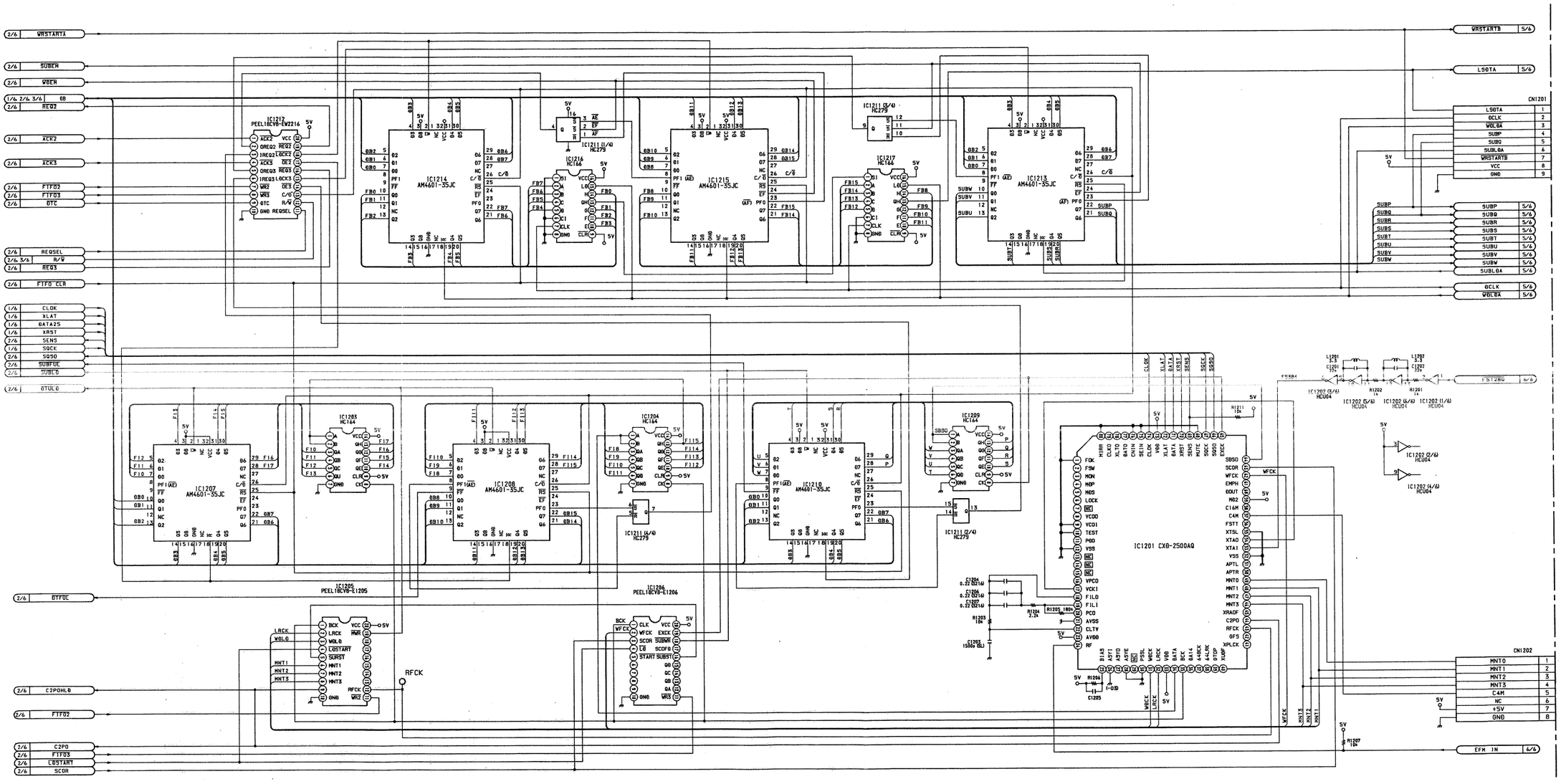

IC1101 TMP68301-12 (TOSHIBA) 100pin FLAT
IC1107 H0634500P12
IC1110 HC138
IC1111 AK27C1024
IC1104 PEEL 18CV8-SC-E1104
IC1113 PEEL 18CV8SC-E1113
IC1114 PEEL 18CV8SC-E1114
IC1115 PEEL 18CV8SC-E1115
IC1109 HC573
IC1108 HC573
IC1106 HC245
IC1107 HC148
IC1116 HC126
IC1117(1/6) HC04
IC1117(2/6) HC04
IC1117(3/6) HC04
IC1117(4/6) HC04
IC1118(1/2) HC74
IC1105 LT1181CS
IC1183 MS1555APF
CN1103
CN1101
CN1102
RS232C IN/OUT
RESET
HALT
BTACK
ENCODE BOARD (2/6)
1-643-495-11
CDW-900E



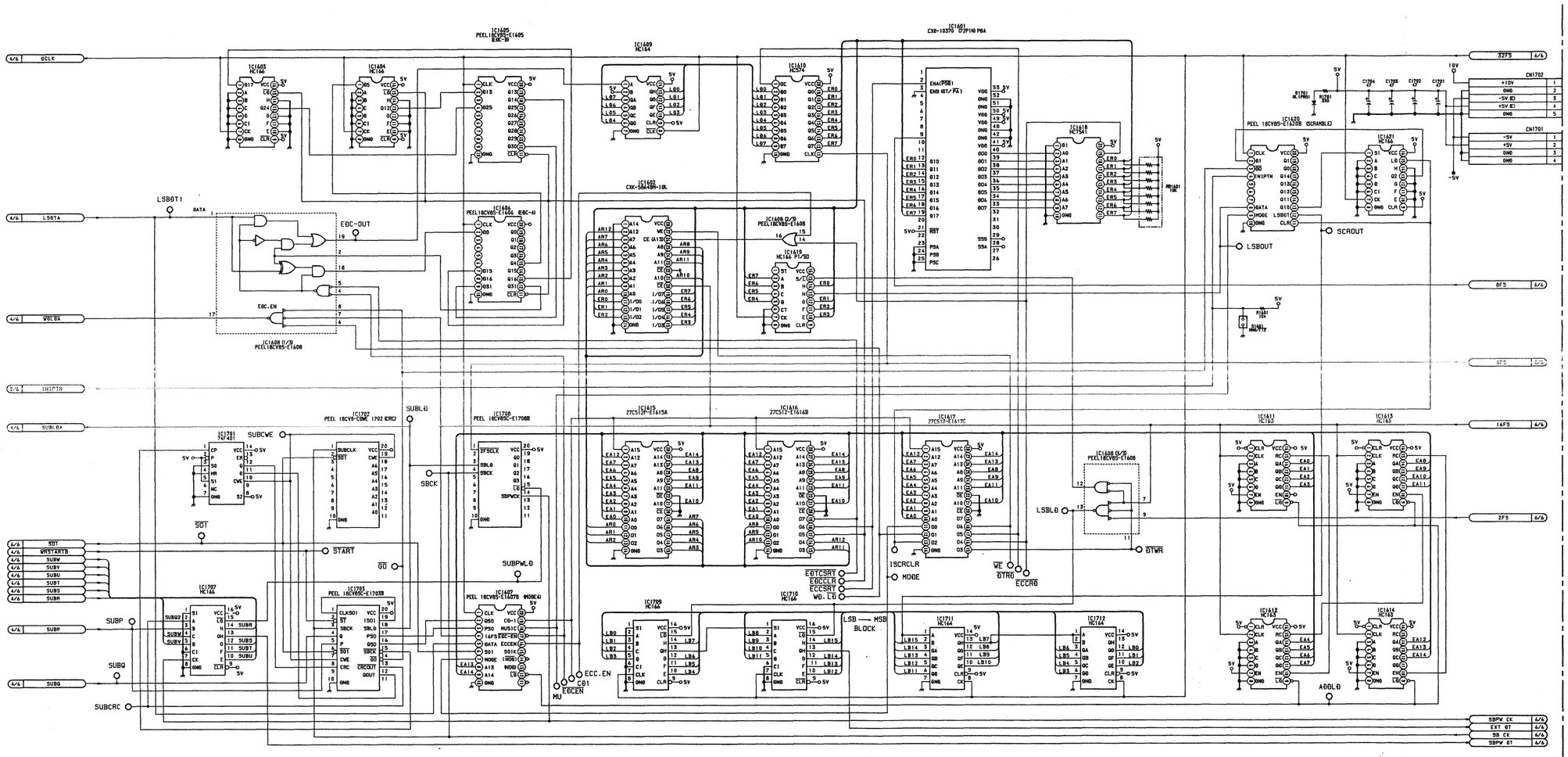
ENCØDE BOARØ (3/6)

1-643-495-11

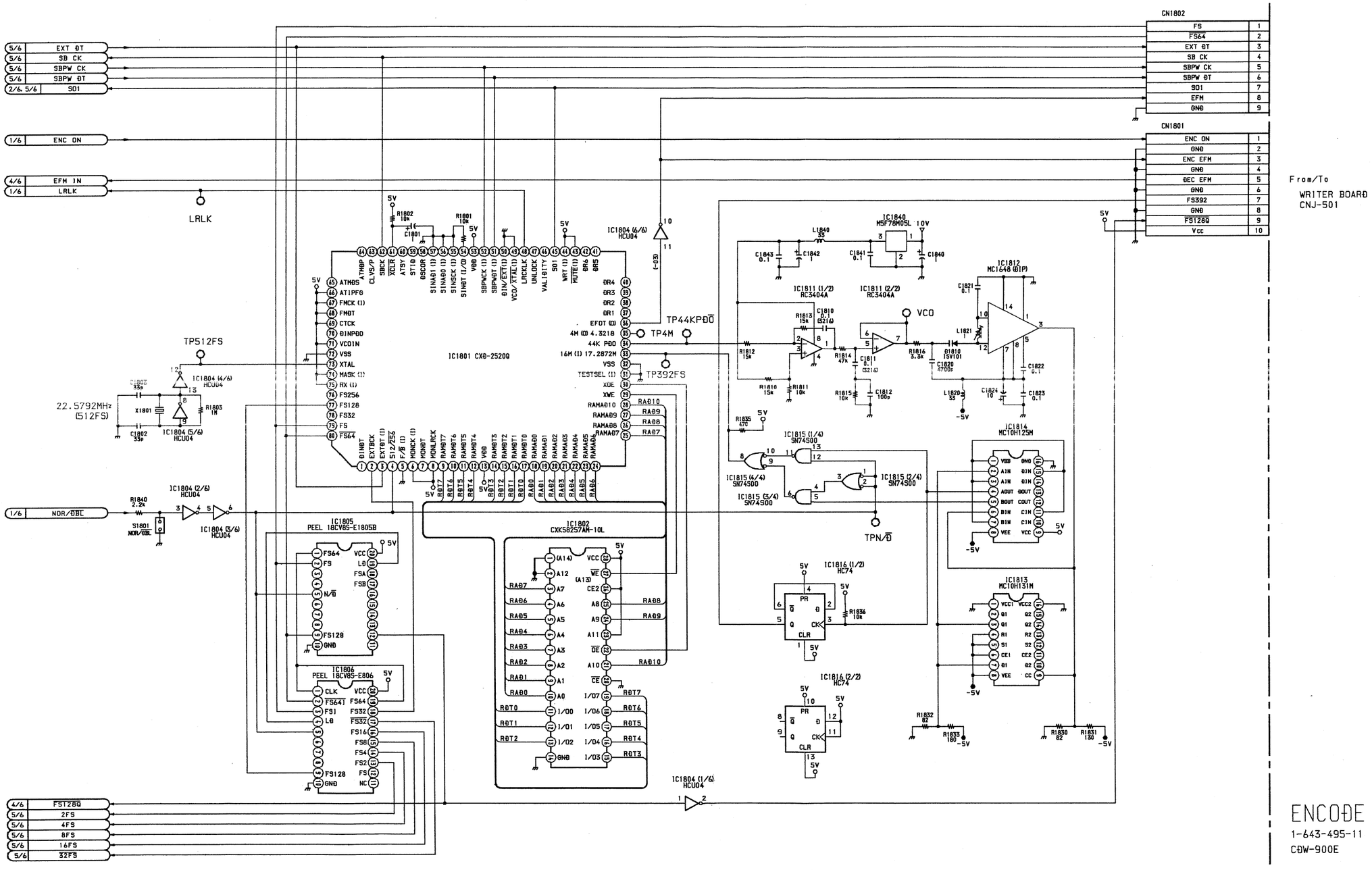
CØW-900E



ENCODE BOARD (4/6)
1-643-495-11
CDW-900E

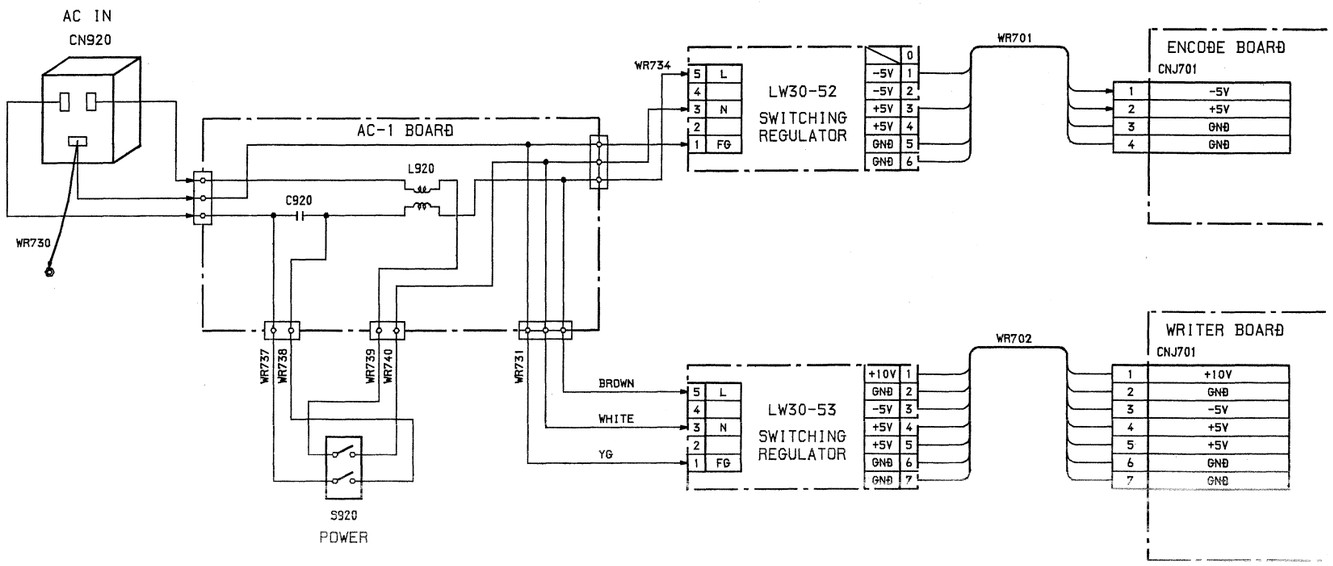


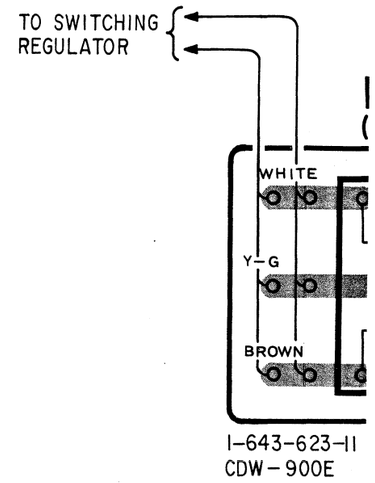
ENCODE BOARD (5/6)
1-643-495-11
CDW-900E

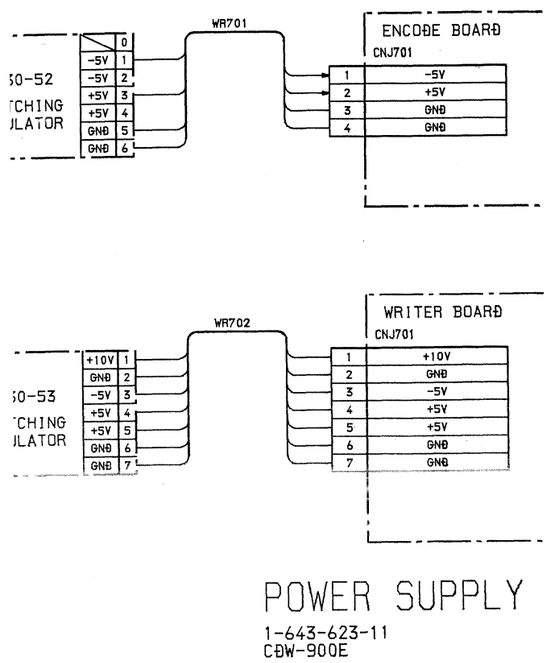


ENCOΔE BOARΔ (6/6)
1-643-495-11
CΔW-900E

5-4-6. Power Supply

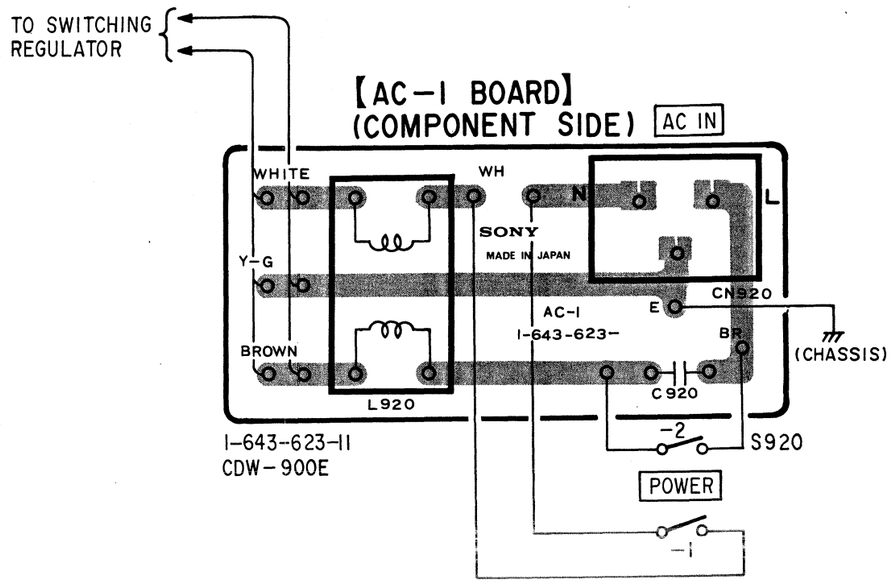






POWER SUPPLY

1-643-623-11
CDW-900E



AC-1

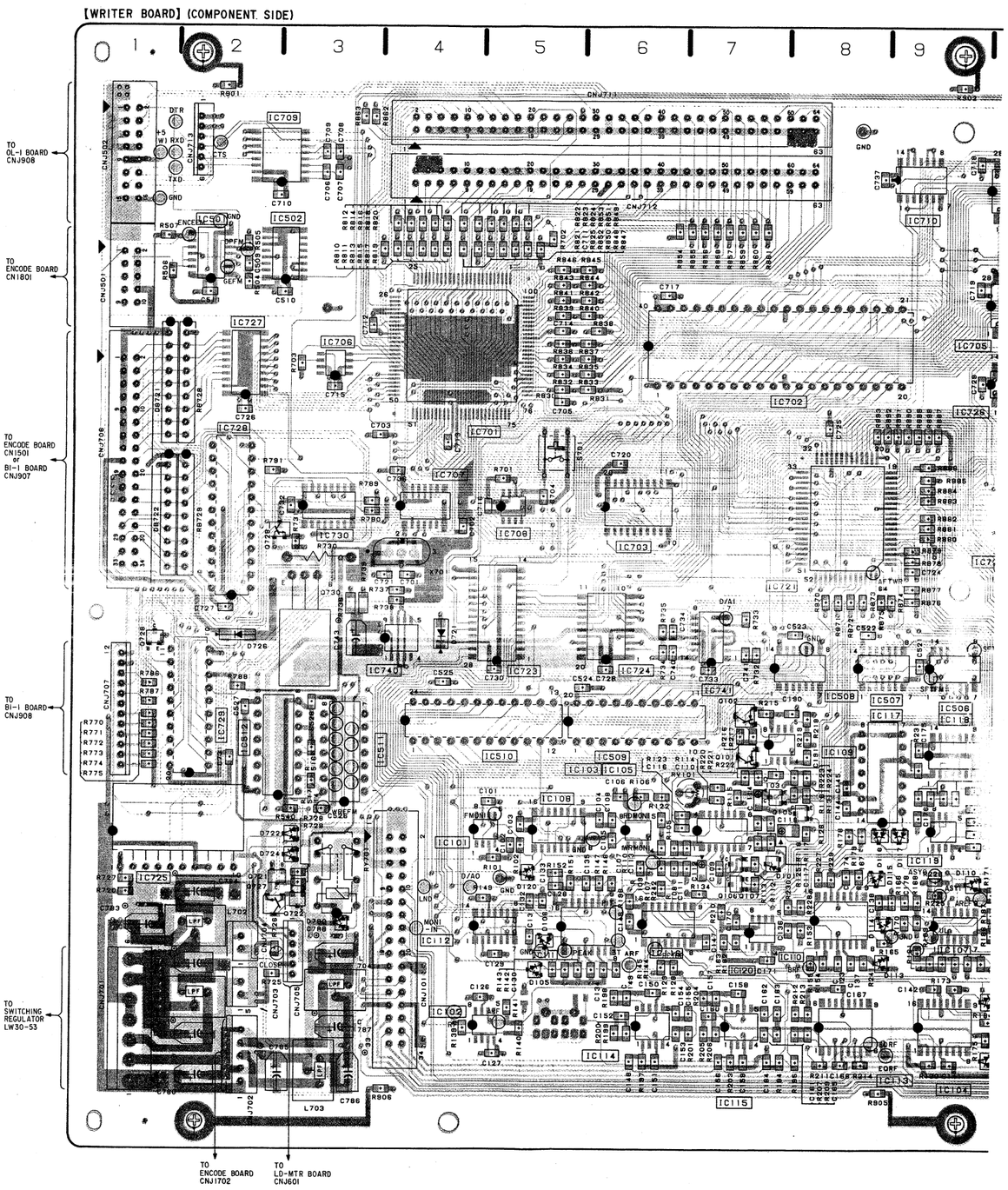
1-643-623-11
CDW-900E

WRITER BOARD LOCATION

CNJ101	J-4	D721	F-4	IC312	G-16	IC517	C-12	Q310	H-11
CNJ401	D-14	D722	H-3	IC313	H-16	IC518	B-12	Q401	F-15
CNJ501	C-1	D724	I-3	IC314	H-16	IC519	D-11	Q402	E-16
CNJ502	B-1	D726	F-2	IC315	I-16	IC520	G-12	Q403	B-17
CNJ701	J-1	D730	F-11	IC316	I-16	IC521	G-11	Q404	A-16
CNJ702	K-2	D731	F-11	IC317	J-16	IC525	F-12	Q405	A-15
CNJ703	J-2	D732	E-11	IC318	H-11	IC526	G-13	Q406	A-15
CNJ704	I-2	D733	E-11	IC319	I-11	IC701	D-4	Q407	A-15
CNJ705	J-3	D734	E-11	IC320	I-11	IC702	D-7	Q408	C-16
CNJ706	E-1	D780	I-3	IC330	F-14	IC703	E-6	Q409	C-16
CNJ707	G-1			IC401	F-16	IC704	B-10	Q501	F-12
CNJ708	I-17	DB721	D-1	IC402	C-15	IC705	C-10	Q721	I-2
CNJ709	H-17	DB722	E-1	IC403	E-16	IC706	D-3	Q722	I-3
CNJ711	A-6			IC404	D-14	IC707	E-4	Q723	H-17
CNJ712	B-6	IC101	H-4	IC405	C-16	IC708	E-5	Q724	H-17
CNJ713	B-2	IC102	J-4	IC406	C-14	IC709	B-2	Q725	H-16
		IC103	H-6	IC407	B-15	IC710	B-9	Q726	I-16
D101	I-7	IC104	J-9	IC408	E-17	IC721	F-8	Q727	I-2
D105	J-5	IC105	H-7	IC409	C-17	IC722	E-10	Q728	F-1
D106	I-5	IC107	I-9	IC410	D-15	IC723	G-5	Q729	E-2
D109	J-10	IC108	H-5	IC411	D-15	IC724	G-6	Q730	F-3
D110	I-9	IC109	H-7	IC412	D-17	IC725	H-1		
D111	J-10	IC110	I-8	IC413	B-16	IC726	D-10	RB728	D-2
D112	K-10	IC111	I-5	IC414	B-14	IC727	D-2	RB729	E-2
D113	J-8	IC112	I-4	IC415	F-14	IC728	E-2		
D114	I-8	IC113	J-8	IC416	K-16	IC729	G-2	RV101	H-7
D115	I-8	IC114	J-6	IC501	C-2	IC730	E-3	RV301	J-11
D116	H-8	IC115	J-7	IC502	C-3	IC740	G-4	RV302	J-12
D117	H-9	IC116	I-6	IC503	E-12	IC741	G-7	RV303	H-14
D120	I-5	IC117	H-8	IC504	F-13			RV304	H-14
D301	I-14	IC118	H-9	IC505	C-12	L701	J-2	RV401	D-16
D302	J-14	IC119	H-9	IC506	G-9	L702	I-2	RV501	D-13
D401	A-16	IC120	I-7	IC507	G-8	L703	K-3	RV502	G-13
D402	A-16	IC302	J-11	IC508	G-8	L704	J-3	RY701	I-3
D403	B-16	IC303	J-12	IC509	G-6				
D404	B-16	IC304	J-13	IC510	G-4	Q101	H-7	S701	E-5
D502	E-13	IC305	J-14	IC511	H-3	Q102	G-7	S702	I-17
D503	E-13	IC306	J-14	IC512	G-2	Q103	H-7		
D504	E-12	IC307	H-14	IC513	C-13	Q105	H-8	X501	G-11
D505	G-12	IC308	I-14	IC514	B-13	Q106	I-7	X701	F-4
D506	G-12	IC310	I-12	IC515	C-13	Q107	I-7		
D507	G-12	IC311	G-17	IC516	D-12	Q303	H-13		

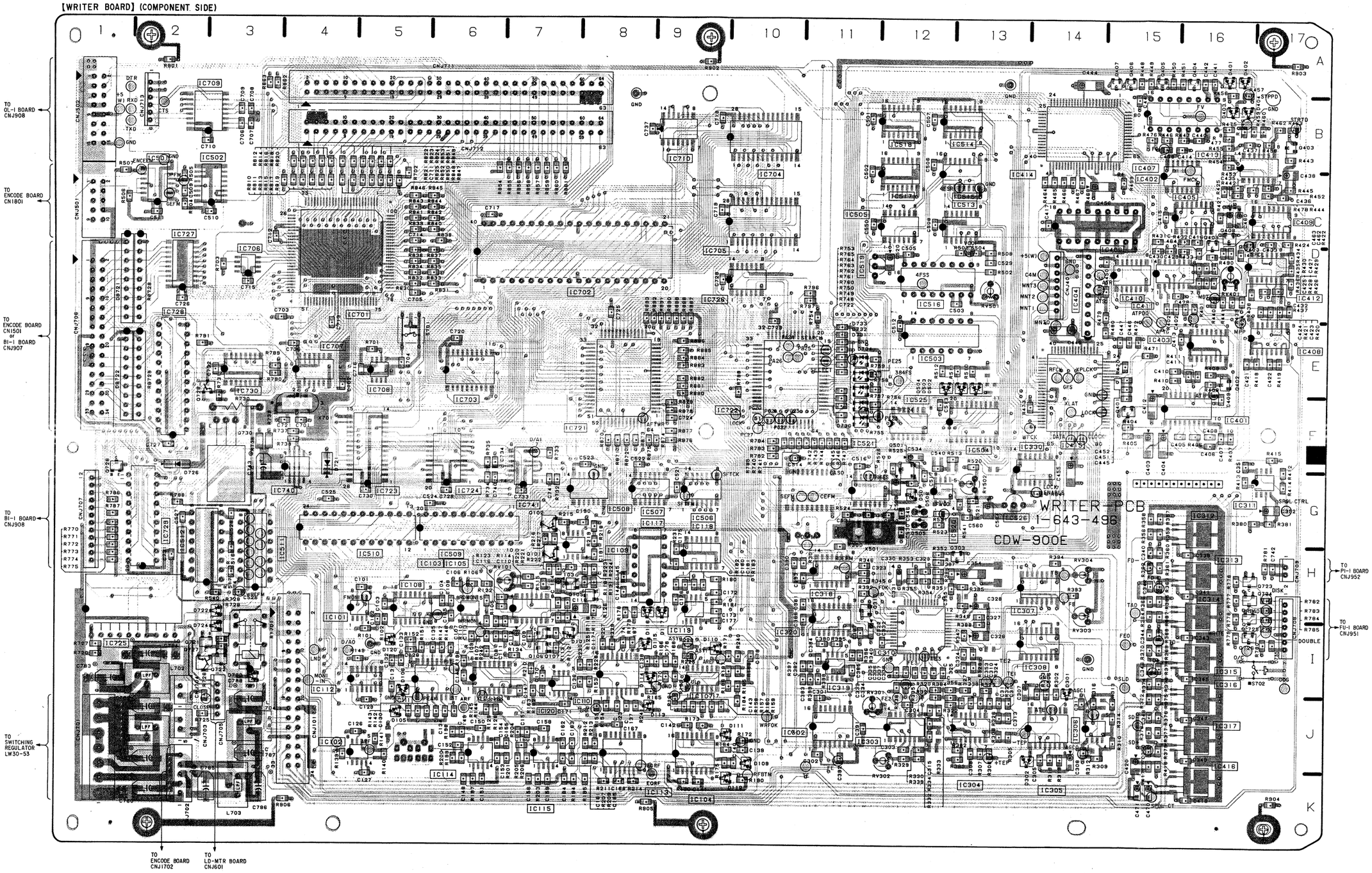
5-4-7. Writer Board

【WRITER BOARD】(COMPONENT SIDE)

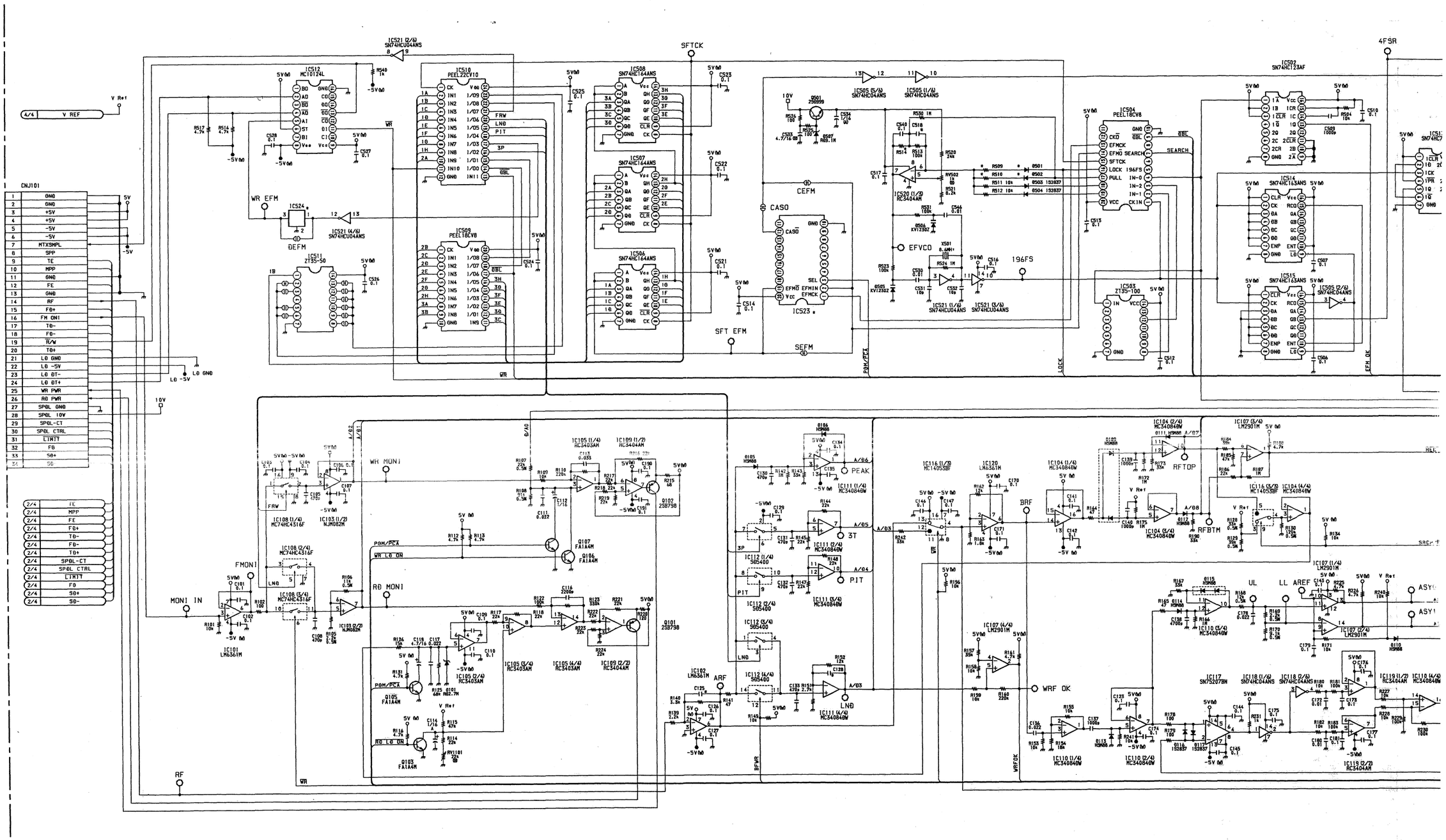

TO OL-I BOARD CNJ908
TO ENCODE BOARD CN1801
TO ENCODE BOARD CN1501 or BI-I BOARD CNJ907
TO BI-I BOARD CNJ908
TO SWITCHING REGULATOR LW30-53
TO ENCODE BOARD CNJ1702
TO LD-MTR BOARD CNJ601

5-4-7. Writer Board

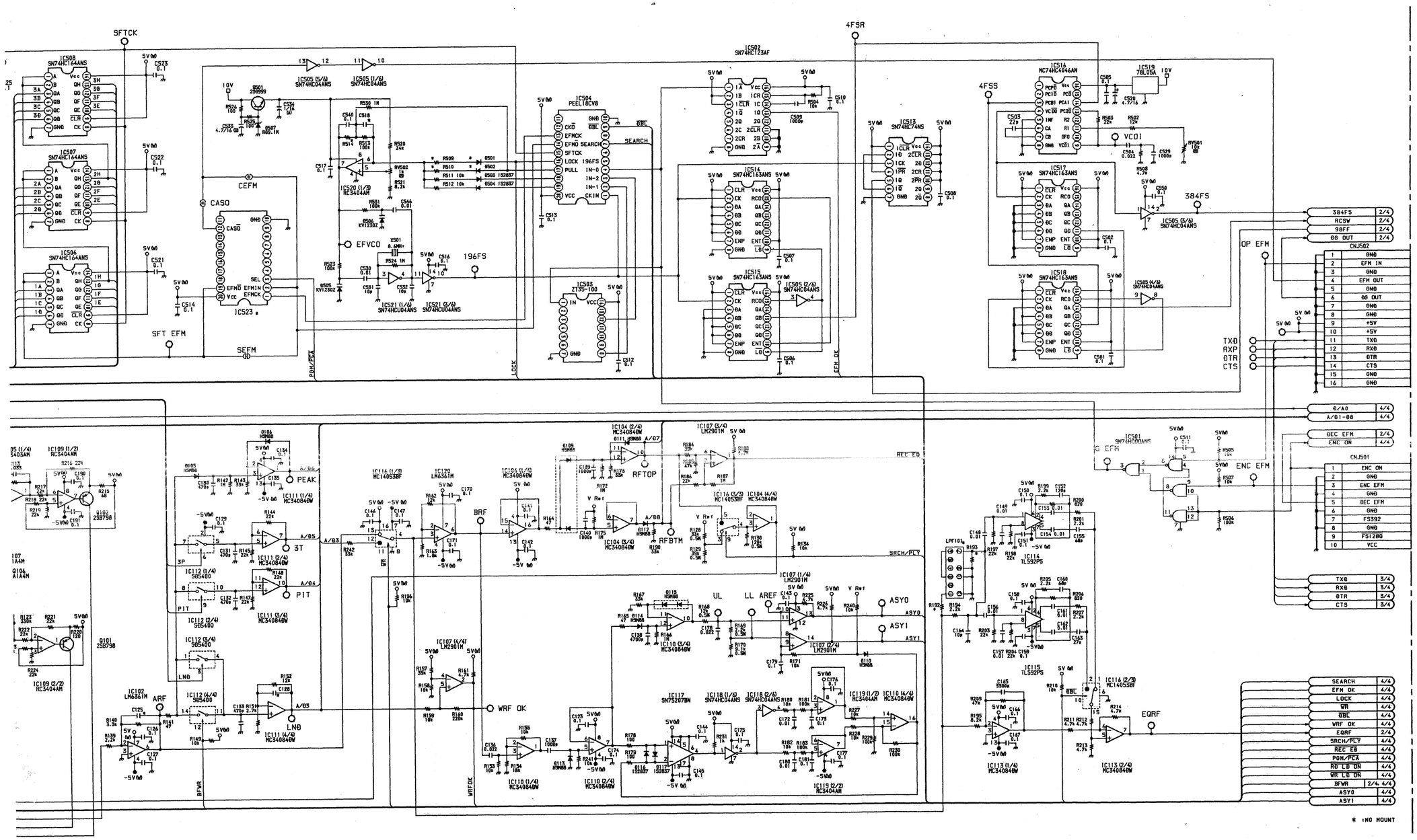
【WRITER BOARD】(COMPONENT SIDE)



WRITER
1-643-496-13
CDW-900E


V Ref
4/4 V REF
CNJ101
1 GND
2 GND
3 +5V
4 +5V
5 -5V
6 -5V
7 MTXSMPL
8 SPP
9 TE
10 MPP
11 GND
12 FE
13 GND
14 RF
15 FO+
16 FM ON1
17 TO-
18 FO-
19 R/W
20 TO+
21 LO GND
22 LO -5V
23 LO DT-
24 LO DT+
25 WR PWR
26 RD PWR
27 SPDL GND
28 SPDL 10V
29 SPDL-CT
30 SPDL CTRL
31 LTMTT
32 FG
33 SD+
34 SD-
2/4 TE
2/4 MPP
2/4 FE
2/4 FO+
2/4 TO+
2/4 FO-
2/4 TO+
2/4 SPDL-CT
2/4 SPDL CTRL
2/4 LTMTT
2/4 FG
2/4 SD+
2/4 SD-
IC512 MC10124L
IC521 (2/6) SN74HCU04ANS
IC521 (4/6) SN74HCU04ANS
IC521 (1/6) SN74HCU04ANS
IC521 (5/6) SN74HCU04ANS
IC510 PEEL22CV10
IC509 PEEL18CV8
IC508 SN74HC164ANS
IC507 SN74HC164ANS
IC506 SN74HC164ANS
IC511 Z135-50
IC524
IC523
IC504 PEEL18CV8
IC520 (1/2) RC5404AM
IC503 Z135-100
IC502 SN74HC123AF
IC514 SN74HC163ANS
IC515 SN74HC163ANS
IC505 (2/6) SN74HC04ANS
IC505 (6/6) SN74HC04ANS
IC505 (1/6) SN74HC04ANS
IC507 (4/4) LM2901M
IC116 (1/3) MC14053BF
IC120 LM6361M
IC104 (1/4) MC340840W
IC104 (2/4) MC340840W
IC104 (3/3) MC14053BF
IC104 (4/4) MC340840W
IC104 (5/4) MC340840W
IC107 (1/4) LM2901M
IC107 (2/4) LM2901M
IC107 (4/4) LM2901M
IC107 (5/4) LM2901M
IC110 (1/4) MC340840W
IC110 (2/4) MC340840W
IC110 (3/4) MC340840W
IC110 (4/4) MC340840W
IC117 SN75207BN
IC118 (1/6) SN74HC04ANS
IC118 (2/6) SN74HC04ANS
IC119 (1/2) RC5404AM
IC119 (2/2) RC5404AM
IC105 (1/4) RC5403AM
IC105 (2/4) RC5403AM
IC105 (3/4) RC5403AM
IC105 (4/4) RC5403AM
IC109 (1/2) RC5404AM
IC109 (2/2) RC5404AM
IC108 (1/4) MC74HC4316F
IC108 (2/4) MC74HC4316F
IC108 (3/4) MC74HC4316F
IC103 (1/2) NJM082M
IC103 (2/2) NJM082M
IC101 LM6361M
IC102 LM6361M
IC112 (1/4) 5N5400
IC112 (2/4) 5N5400
IC112 (3/4) 5N5400
IC112 (4/4) 5N5400
IC111 (1/4) MC340840W
IC111 (2/4) MC340840W
IC111 (3/4) MC340840W
IC111 (4/4) MC340840W
Q501 2SD899
Q101 2SB798
Q102 2SB798
Q103 FA1A4M
Q104 FA1A4M
Q105 FA1A4M
Q106 FA1A4M
Q107 FA1A4M
XS01 8.4MH
RV101 50k
RV102 10k
RV501 50k
RV502 10k
RV503 10k
RV504 10k
RV505 10k
RV506 10k
SFTCK
SFT EFM
CEFM
SEFM
CASO
EFVCO
196FS
4FSR
SEARCH
LOCK
EFM OK
WR EFM
WR MONI
RD MONI
FMONI
MONI IN
RF
WR
WR LD ON
RD LD ON
PDM/PCA
FRW
LND
PIT
3P
3T
ARF
BRF
PEAK
RFTOP
RFBTM
WRF OK
WRFOK
BFWR
VL
LL
AREF
ASY
5V
-5V
10V

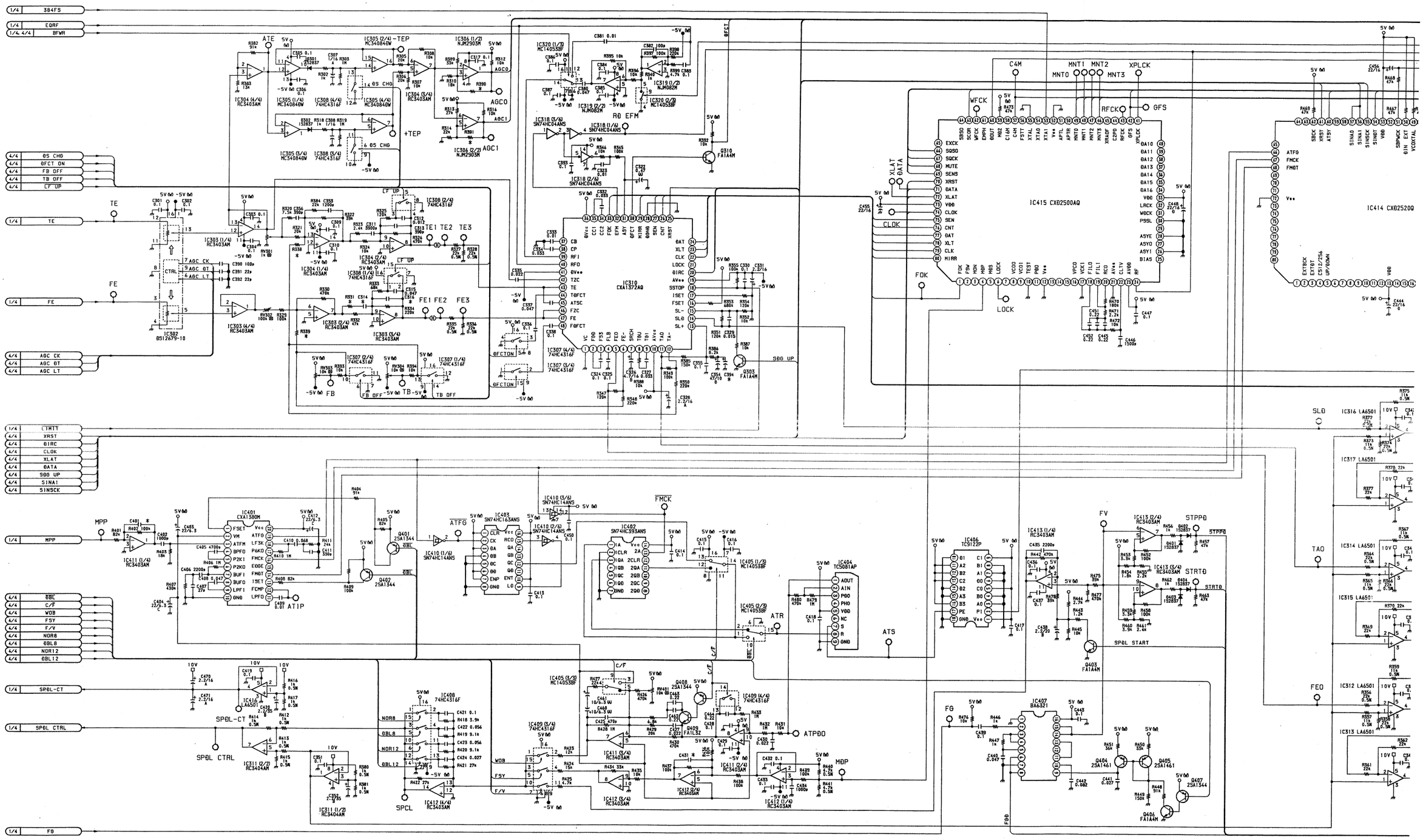
WRITER(1/4)

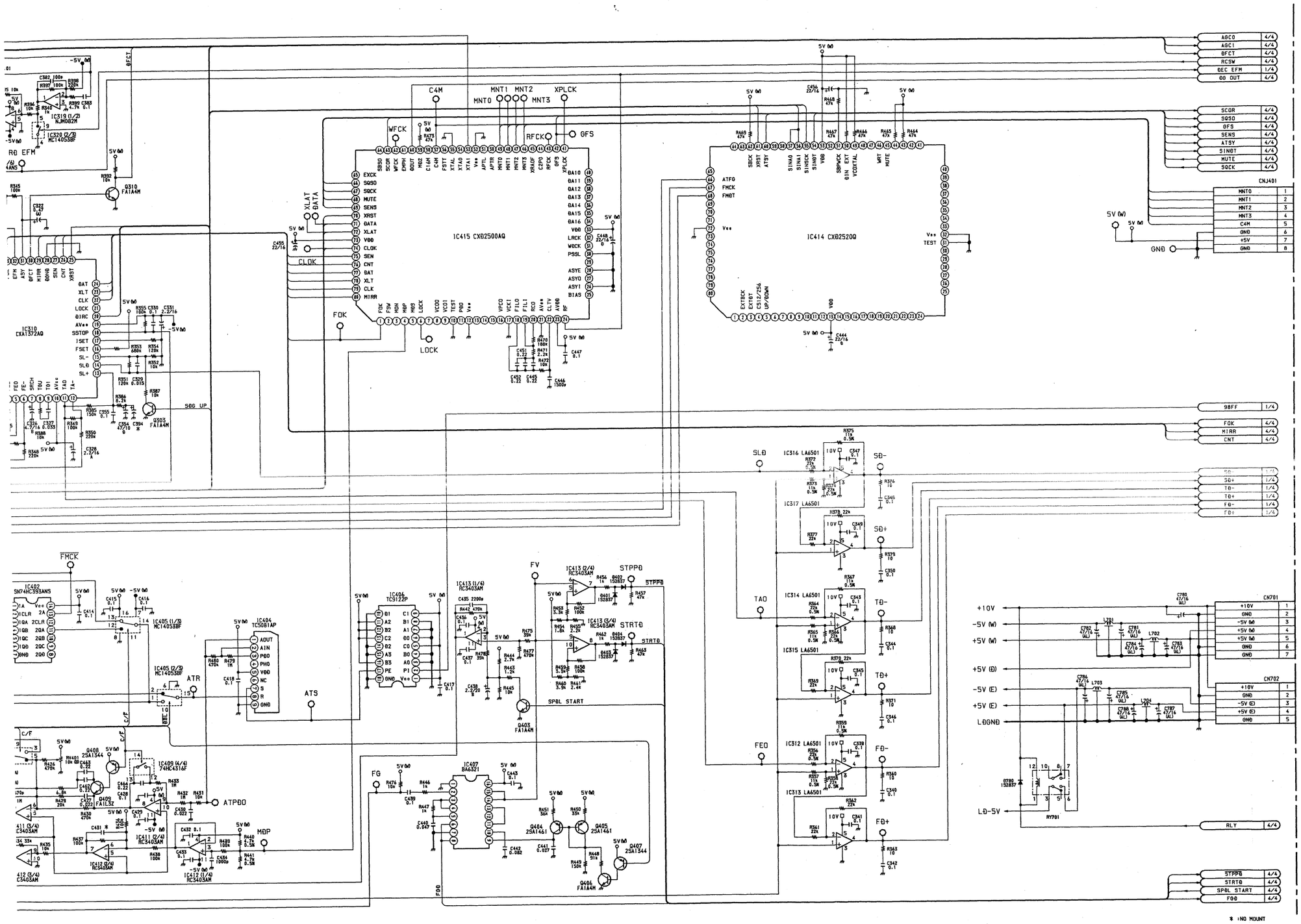


WRITER BOARD (1/4)

1-643-496-13

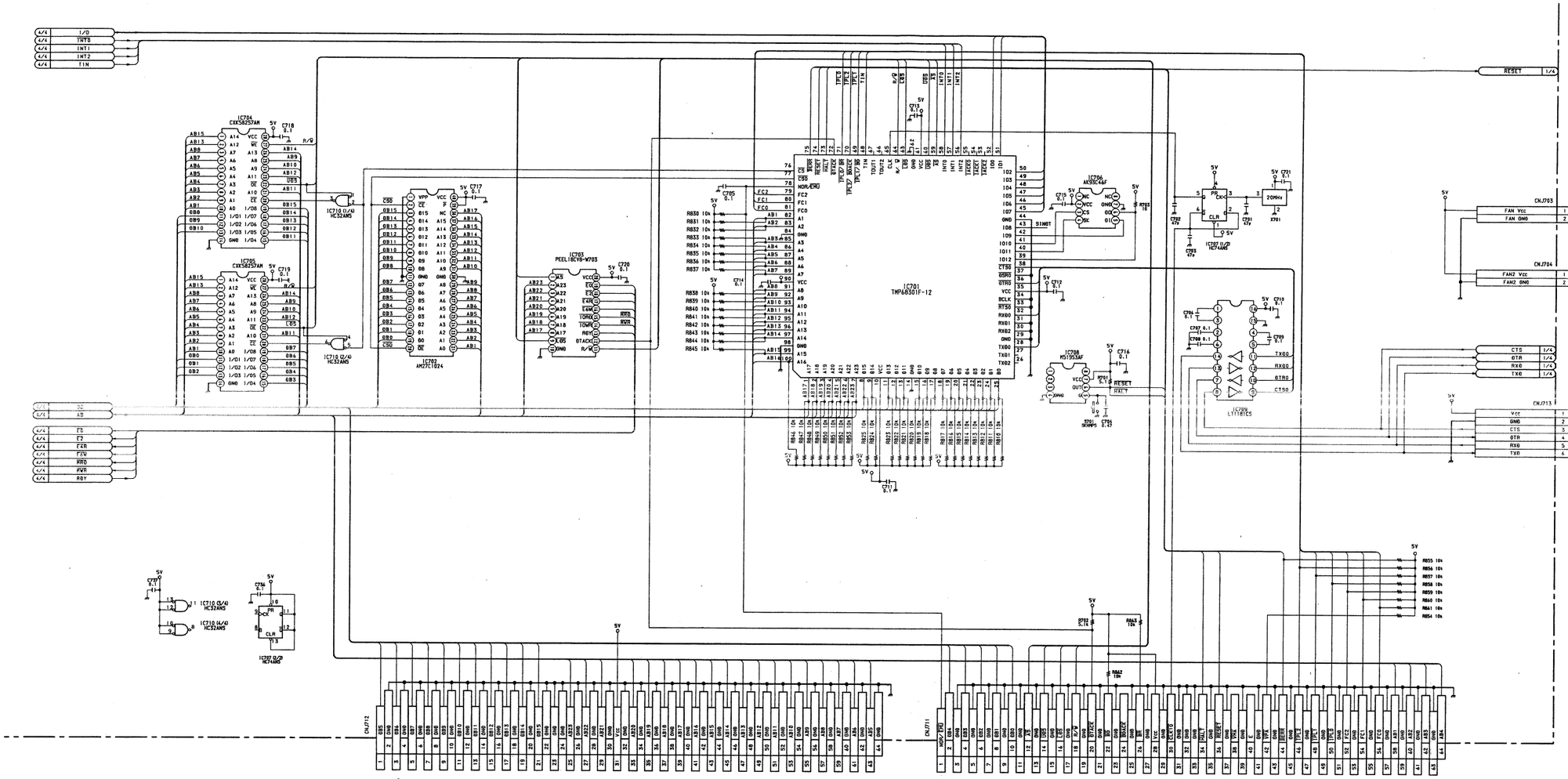
CDW-900E


1/4 384FS
1/4 EQRF
1/4, 4/4 BFWR
4/4 05 CHG
4/4 BFCT ON
4/4 FB OFF
4/4 TB OFF
4/4 CF UP
TE
1/4 TE
FE
1/4 FE
4/4 AGC CK
4/4 AGC DT
4/4 AGC LT
1/4 CTRIT
4/4 XRST
4/4 DIRC
4/4 CLOK
4/4 XLAT
4/4 DATA
4/4 SQG UP
4/4 SINA1
4/4 SINSCK
1/4 MPP
4/4 DBL
4/4 C/F
4/4 WOB
4/4 FSY
4/4 F/V
4/4 NOR8
4/4 DBL8
4/4 NOR12
4/4 DBL12
1/4 SPDL-CT
1/4 SPDL CTRL
1/4 FG
ATE
+TEP
-TEP
AGC0
AGC1
ATIP
FB
TB
FE1 FE2 FE3
TE1 TE2 TE3
RF EFM
ATR
ATS
ATPDO
MDP
SQG UP
SPDL-CT
SPDL CTRL
SPCL
SLD
TAO
FEO
FV
STPPD
STRTD
SPDL START
FG
FOD
XLAT
DATA
CLOK
FOK
LOCK
C4M
MNT0 MNT1 MNT2 MNT3
XPLCK
WFCK
RFCK
GFS
IC301 0512679-10
IC303 (1/4) RC3403AM
IC303 (4/4) RC3403AM
IC303 (2/4) RC3403AM
IC303 (5/4) RC3403AM
IC304 (1/4) RC3403AM
IC304 (2/4) RC3403AM
IC304 (4/4) RC3403AM
IC305 (1/4) MC34084DW
IC305 (2/4) MC34084DW
IC305 (4/4) MC34084DW
IC305 (5/4) MC34084DW
IC306 (1/2) NJM2903M
IC306 (2/2) NJM2903M
IC307 (1/4) 74HC4316F
IC307 (2/4) 74HC4316F
IC307 (3/4) 74HC4316F
IC307 (5/4) 74HC4316F
IC308 (1/4) 74HC4316F
IC308 (2/4) 74HC4316F
IC308 (4/4) 74HC4316F
IC308 (5/4) 74HC4316F
IC310 CXA1372AQ
IC311 (1/2) RC3404AM
IC311 (2/2) RC3404AM
IC312 LA6501
IC313 LA6501
IC314 LA6501
IC315 LA6501
IC316 LA6501
IC317 LA6501
IC318 (1/6) SN74HC04ANS
IC318 (2/6) SN74HC04ANS
IC318 (5/6) SN74HC04ANS
IC319 (1/2) NJM082M
IC319 (2/2) NJM082M
IC320 (1/3) MC14053BF
IC320 (2/3) MC14053BF
IC320 (3/3) MC14053BF
IC401 CXA1380M
IC402 SN74HC163ANS
IC403 SN74HC163ANS
IC404 TC5081AP
IC405 (1/3) MC14053BF
IC405 (2/3) MC14053BF
IC405 (3/3) MC14053BF
IC406 TC9122P
IC407 BA6321
IC408 74HC4316F
IC409 (3/4) 74HC4316F
IC409 (4/4) 74HC4316F
IC410 (1/6) SN74HC14ANS
IC410 (2/6) SN74HC14ANS
IC410 (3/6) SN74HC14ANS
IC411 (1/4) RC3403AM
IC411 (2/4) RC3403AM
IC411 (4/4) RC3403AM
IC412 (2/4) RC3403AM
IC412 (4/4) RC3403AM
IC412 (5/4) RC3403AM
IC413 (1/4) RC3403AM
IC413 (2/4) RC3403AM
IC413 (5/4) RC3403AM
IC414 CXD2520Q
IC415 CXD2500AQ
IC492 SN74HC595ANS
Q310 FA1A4M
Q401 2SA1344
Q402 2SA1344
Q403 FA1A4M
Q404 2SA1461
Q405 2SA1461
Q406 FA1A4M
Q407 2SA1344
Q408 2SA1344
Q409 FA1L5Z
5V
-5V
10V

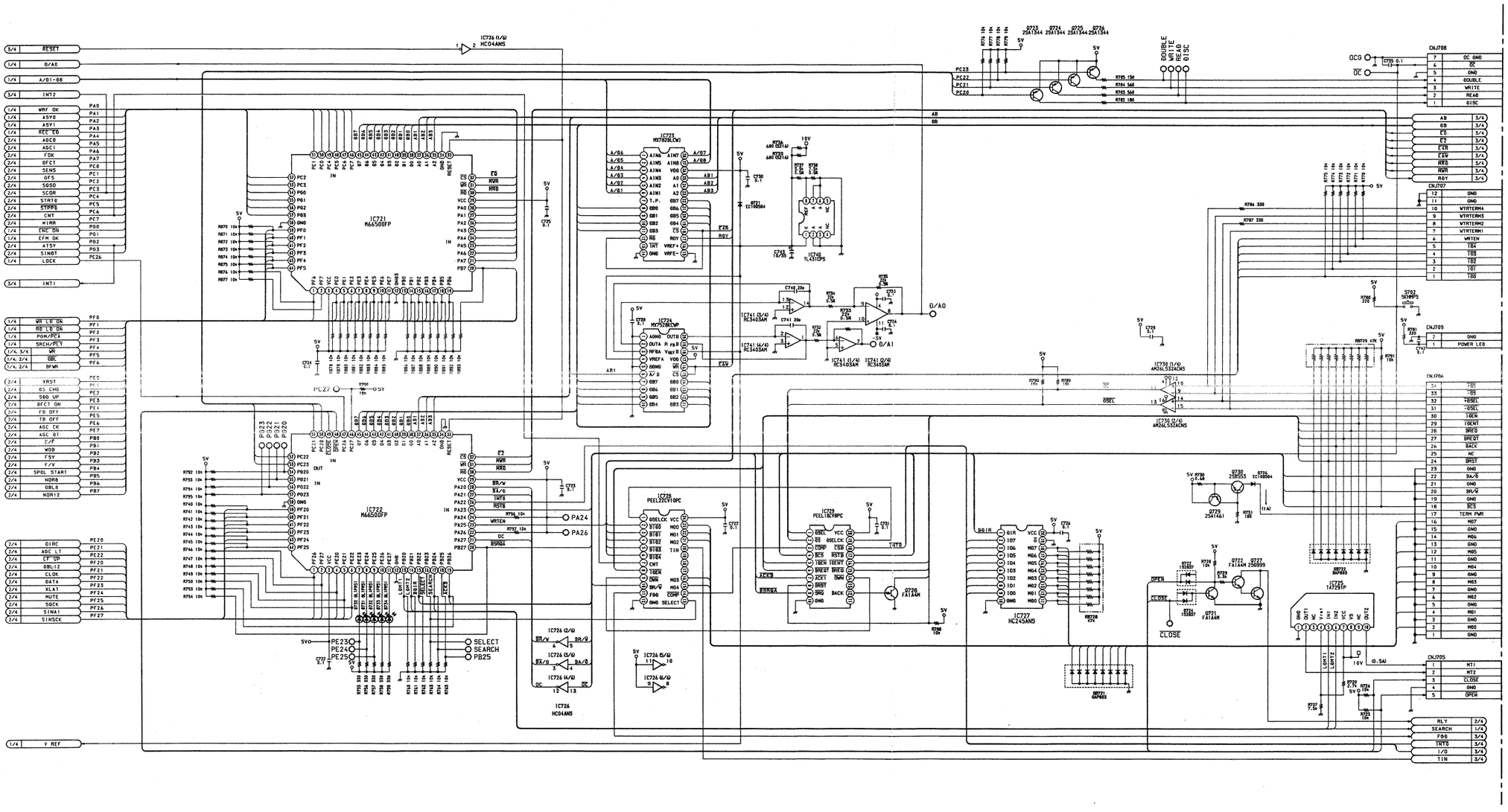


WRITER BOARD (2/4)
1-643-496-13
COW-900E

* :NO MOUNT



WRITER BOARD (3/4)
1-643-496-13
CDW-900E



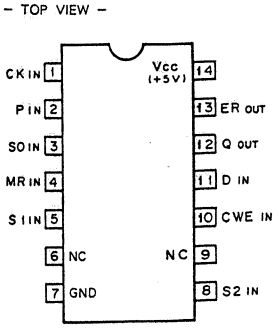
WRITER BOARD (4/4)
1-643-496-13
COW-900E

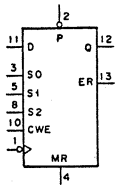
5-5. SEMI CONDUCTOR PIN ASSIGNMENTS

TYPE	PAGE	TYPE	PAGE	TYPE	PAGE
10E-2	5-71	LT1181CS	5-57	PEEL18CV8SC-E1806	5-62
1SV101	5-71	M51953AFP	5-57	PEEL18CV8SC-W703	5-62
2SA1175-HFE	5-70	M5F78M05L	5-57	PEEL22CV10-W510F	5-62
2SA1344	5-70	M66500FP	5-58	PEEL22CV10-W728C	5-62
2SA1461-Y23	5-70	MA152WK	5-71	RC3403AM	5-62
2SB553-Y	5-70	MB1431A	5-58	RC3404AM	5-62
2SB798-DL	5-70	MBM27C512P-E1615A	5-59	RC78L05A	5-63
2SD774-34	5-70	MBM27C512P-E1616B	5-59	RD2.7M-B2	5-71
2SD999-CLCK	5-70	MBM27C512P-E1617C	5-59	RD9.1M-B1	5-71
74F401PC	5-50	MC10H125M	5-59	SD5400CY	5-63
AK93C46F	5-50	MC10H131M	5-59	SLB-25YY	5-71
AM26LS31CNS	5-50	MC1648P-1	5-59	SN74HC00ANS	5-63
AM26LS32ACNS	5-50	MC34084DW	5-59	SN74HC04ANS	5-63
AM27C1024-ENC1.14	5-50	MC74HC4046AN	5-59	SN74HC126ANS	5-63
AM27C1024-WTR1.12	5-50	MC74HC4316F	5-60	SN74HC138ANS	5-63
AM4601-35JC	5-51	MT4C4001JDJ-8	5-60	SN74HC148NS	5-64
BA6321	5-51	MX7528KCWP	5-60	SN74HC14ANS	5-64
CXA1372AQ	5-51	MX7828LCWI	5-61	SN74HC163ANS	5-64
CXA1380M	5-52	NCR53C96	5-61	SN74HC164NS	5-64
CXD1037G	5-52	NJM082M	5-62	SN74HC166ANS	5-65
CXD2500AQ	5-53	NJM3404AM	5-62	SN74HC245ANS	5-65
CXD2520Q	5-54	PEEL18CV8-W509F	5-62	SN74HC32ANS	5-65
CXK58257AM-10L	5-54	PEEL18CV8PC-W1D5	5-62	SN74HC393ANS	5-65
CXK5864BM-10L	5-55	PEEL18CV8S-W504F3	5-62	SN74HC541ANS	5-65
DAP803	5-71	PEEL18CV8SC-E1104B	5-62	SN74HC573BNS	5-66
DS1267S-10	5-55	PEEL18CV8SC-E1113	5-62	SN74HC574ANS	5-66
EC10QS-04	5-71	PEEL18CV8SC-E1114B	5-62	SN74HC74ANS	5-66
FA1A4M-L33	5-70	PEEL18CV8SC-E1115	5-62	SN74HCT541ANS	5-65
FA1L3Z-L37	5-70	PEEL18CV8SC-E1205C	5-62	SN74HCU04ANS	5-63
FMP1	5-71	PEEL18CV8SC-E1206B	5-62	SN74S00NS	5-66
GL1PR51	5-71	PEEL18CV8SC-E1212D	5-62	SN75207BN	5-66
GL8HY21	5-71	PEEL18CV8SC-E1302B	5-62	TA7291P	5-67
GL8KG21	5-71	PEEL18CV8SC-E1402C	5-62	TC5081AP	5-67
HD10124	5-55	PEEL18CV8SC-E1605	5-62	TC74HC123F	5-67
HD14053BFP	5-55	PEEL18CV8SC-E1606	5-62	TC74HC279AF	5-67
HD63450CP10	5-56	PEEL18CV8SC-E1607B	5-62	TC9122P	5-68
HSM88AS	5-71	PEEL18CV8SC-E1608	5-62	TL431CPS	5-68
KV1230Z	5-71	PEEL18CV8SC-E1620B	5-62	TL592PS	5-68
LA6501	5-57	PEEL18CV8SC-E1702	5-62	TMP68301F	5-68
LM2901M	5-57	PEEL18CV8SC-E1703B	5-62	TORX176	5-69
LM2903M	5-57	PEEL18CV8SC-E1708B	5-62	TOTX176	5-69
LM6361M	5-57	PEEL18CV8SC-E1805B	5-62		

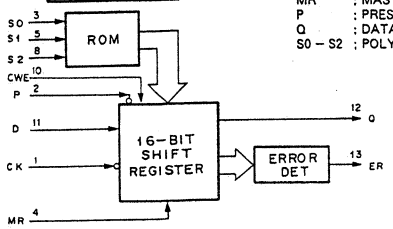
74F401PC (FSC)

TTL CRC GENERATOR/CHECKER
– TOP VIEW –





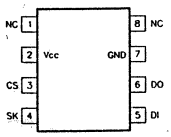
CK	; CLOCK INPUT
CWE	; CHECK WORD ENABLE INPUT
D	; DATA INPUT
ER	; ERROR OUTPUT
MR	; MASTER RESET INPUT
P	; PRESET INPUT
Q	; DATA OUTPUT
S0 – S2	; POLYNOMIAL SELECT INPUTS

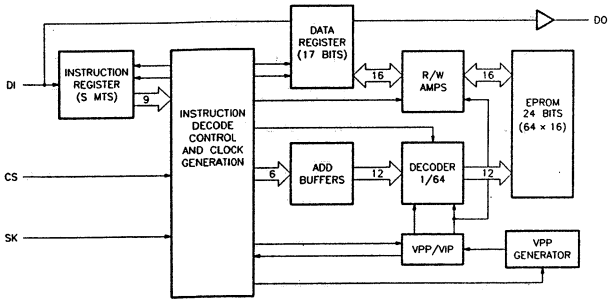


SELECT CODE			POLYNOMIAL	REMARKS
S2	S1	S0		
L	L	L	$X^{16} + X^{15} + X^2 + 1$	CRC-16
L	L	H	$X^{16} + X^{14} + X + 1$	CRC-16 REVERSE
L	H	L	$X^{16} + X^{15} + X^{13} + X^7 + X^4 + X^2 + X^1 + 1$	
L	H	H	$X^{12} + X^{11} + X^3 + X^2 + X + 1$	CRC-12
H	L	L	$X^7 + X^6 + X^4 + X^2 + X + 1$	
H	L	H	$X^8 + 1$	LRC-8
H	H	L	$X^{16} + X^{12} + X^5 + 1$	CRC-CCITT
H	H	H	$X^{16} + X^{11} + X^4 + 1$	CRC-CCITT REVERSE

AK93C46F

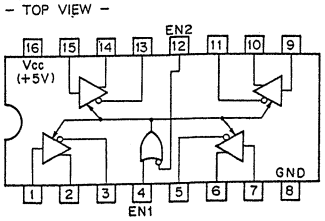
1024 ELECTRICALLY ERASABLE NONVOLATILE MEMORY
– TOP VIEW –





AM26LS31CNS (TI) FLAT PACKAGE

HIGH SPEED DIFFERENTIAL LINE DRIVER
– TOP VIEW –

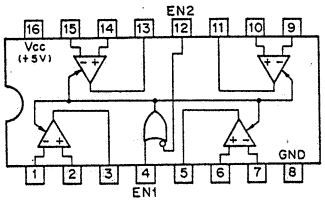


FUNCTION TABLE		
EN2	EN1	OUTPUT
0	0	ENABLE
0	1	ENABLE
1	0	HI-Z
1	1	ENABLE

0 ; LOW LEVEL
1 ; HIGH LEVEL
HI-Z ; HIGH IMPEDANCE

AM26LS32ACNS (TI) FLAT PACKAGE

HIGH SPEED DIFFERENTIAL LINE RECEIVER
– TOP VIEW –



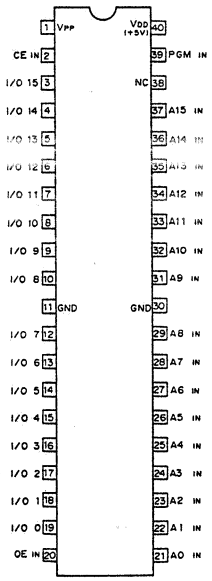
FUNCTION TABLE		
EN2	EN1	OUTPUT
0	0	ENABLE
0	1	ENABLE
1	0	HI-Z
1	1	ENABLE

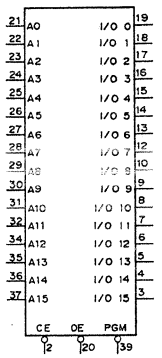
0; LOW LEVEL
1; HIGH LEVEL
HI-Z; HIGH IMPEDANCE

	SENSE	INPUT VOLT
LS32	±200mV	±7V
LS33	±500mV	±15V

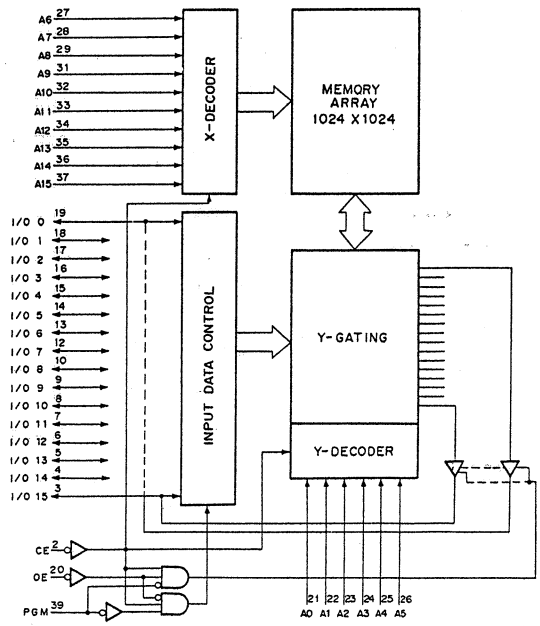
AM27C1024-ENC1.14
AM27C1024-WTR1.12

C-MOS 1M (65536x16)-BIT UV EPROM
– TOP VIEW –





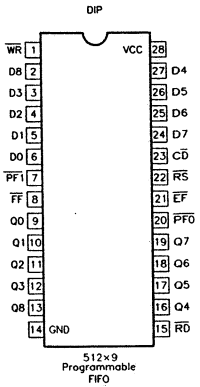
A0 – A15	; ADDRESS INPUTS
CE	; CHIP ENABLE INPUT
I/O0 – I/O15	; DATA INPUTS/OUTPUTS
OE	; OUTPUT ENABLE INPUT
PGM	; PROGRAM ENABLE INPUT
V_{PP}	; PROGRAM VOLTAGE INPUT NORMAL ; + 5V, PROGRAM ; + 12.5V

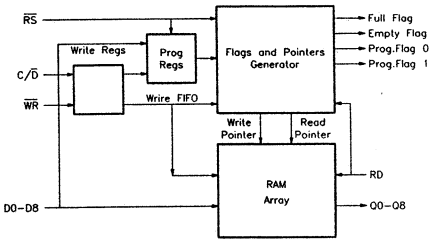


AM4601-35JC

PROGRAMMABLE-FLAGS, 512 x 9 FIFO

— TOP VIEW —

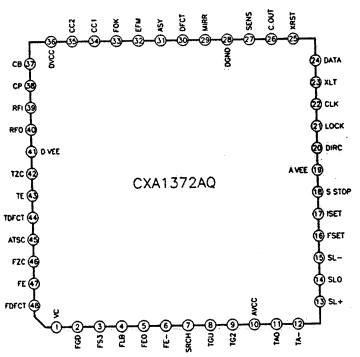




CXA1372AQ

CD RF SIGNAL PROCESSING
SERVO AMPLIFIER

— TOP VIEW —

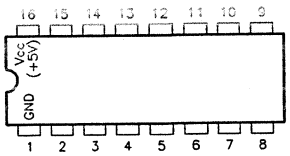


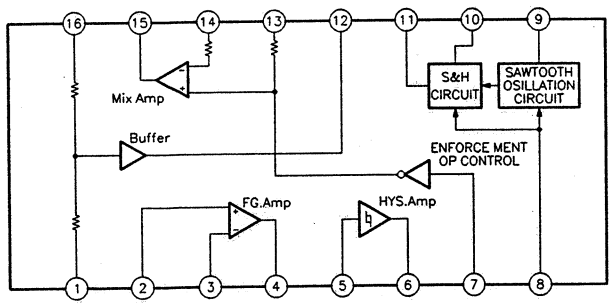
Pin	Symbol	I/O	Pin	Symbol	I/O
1	VC	I	25	XRST	I
2	FGD	I	26	SENS	O
3	FS3	I	27	C. OUT	O
4	FLB	I	29	MIRR	O
5	FEO	O	30	DFCT	O
6	FE-	I	31	ASY	I
7	SRCH	I	32	EFM	O
8	TGU	I	33	FOK	O
9	TG2	I	34	CC1	I
11	TAO	O	35	CC2	O
12	TA-	I	37	CB	I
13	SL+	I	38	CP	I
14	SLO	O	39	RFI	I
15	SL-	I	40	RFO	O
16	FSET	I	42	TZC	I
17	ISET	I	43	TE	I
18	SSTOP	I	44	TDFCT	I
20	DIRC	I	45	ATSC	I
21	LOCK	I	46	FZC	I
22	CLK	I	47	FE	I
23	XLT	I	48	FDFCT	I
24	DATA	I			

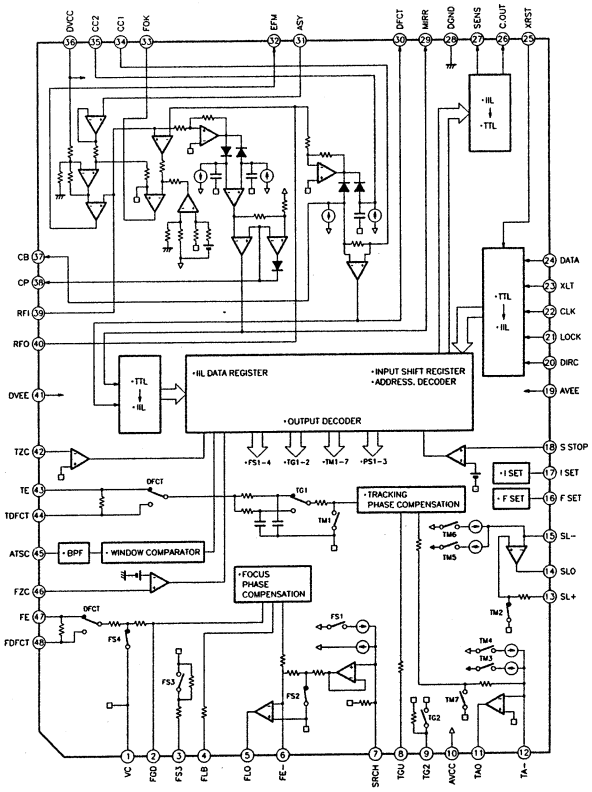
BA6321

FG SYSTEM SPEED CONTROL IC

— TOP VIEW —



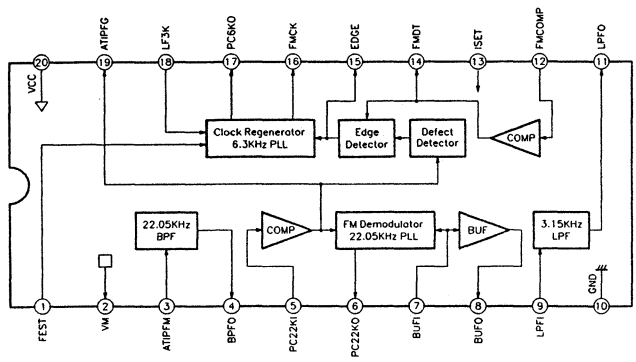




CXA1380M

MO-CD ATIP DEMODULATOR IC

— TOP VIEW —

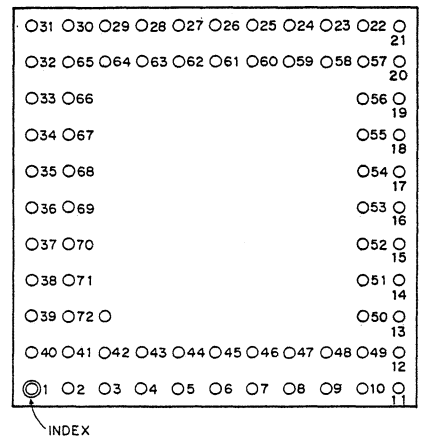


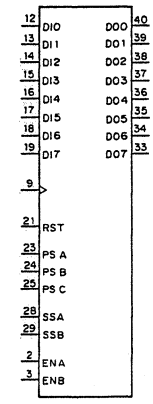
Pin	Symbol	I/O	Pin	Symbol	I/O
1	FSET	–	11	LPFO	O
2	VM	O	12	FMCOMP	I
3	ATIPFM	I	13	ISET	–
4	BPFO	O	14	FMDT	O
5	PC22KI	I	15	EDGE	O
6	PC22KO	O	16	FMCK	O
7	BUFI	I	17	PC8KO	O
8	BUFO	O	18	LF3K	I
9	LPFI	I	19	ATIPFG	O
10	GND	–	20	VCC	–

CXD1037G (SONY)

C-MOS REED-SOLOMON DECODER

— TOP VIEW —





PIN NO.	IN	OUT	SYMBOL	PIN NO.	IN	OUT	SYMBOL	PIN NO.	IN	OUT	SYMBOL	PIN NO.	IN	OUT	SYMBOL
1			NC	19	O		DI7	37		O	D03	55			NC
2	O		ENA	20			NC	38		O	D02	56			NC
3	O		ENB	21	O		RST	39		O	D01	57			VDD(+5V)
4			NC	22			NC	40		O	D00	58			GND
5			NC	23	O		PSA	41			VDD(+5V)	59			NC
6			NC	24	O		PSB	42			GND	60			NC
7			NC	25	O		PSC	43			NC	61			NC
8			NC	26			NC	44			NC	62			NC
9	O		CK	27			NC	45			NC	63			NC
10			NC	28	O		SSA	46			NC	64			GND
11			NC	29	O		SSB	47			NC	65			VDD(+5V)
12	O		DI0	30			NC	48			GND	66			NC
13	O		DI1	31			NC	49			VDD(+5V)	67			NC
14	O		DI2	32			NC	50			NC	68			NC
15	O		DI3	33		O	D07	51			NC	69			NC
16	O		DI4	34		O	D06	52			NC	70			NC
17	O		DI5	35		O	D05	53			NC	71			NC
18	O		DI6	36		O	D04	54			NC	72			NC

DI0-DI7;DATA INPUTS
D00-D07;DATA/PARITY OUTPUTS
RST;RESET INPUT
PSA,PSB,PSC;PARITY WORD SELECT INPUTS
SSA,SSB;INTERLEAVE SELECT INPUTS
ENA;DATA ENABLE INPUT
ENB;DATA/$\overline{\text{PARITY}}$ OUTPUT SELECT INPUT

PARITY SELECT

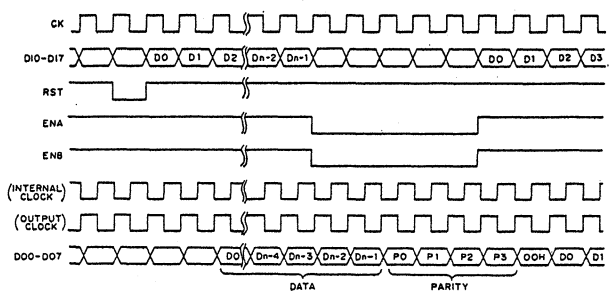
PSA	PSB	PSC	PARITY WORD
0	0	0	2 WORDS
0	0	1	3 WORDS
0	1	0	4 WORDS
0	1	1	6 WORDS
1	X	X	8 WORDS

INTERLEAVE SELECT

SSA	SSB	INTERLEAVE
0	0	1 WORD
0	1	2 WORDS
1	0	3 WORDS
1	1	4 WORDS

0; LOW LEVEL
1; HIGH LEVEL
X; DON'T CARE

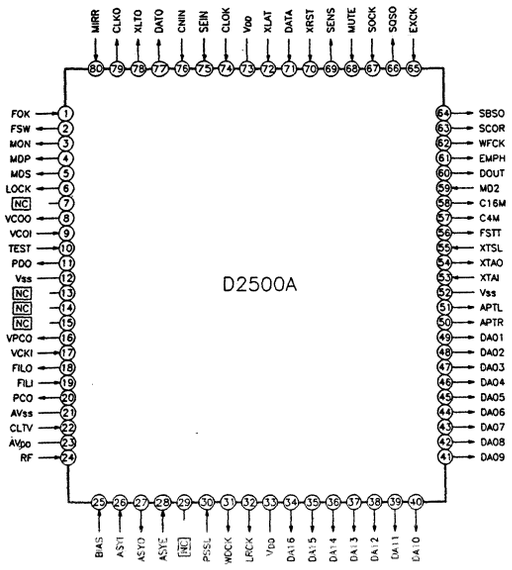
TIMING CHART (PARITY WORD=4WORDS, INTERLEAVE = 1WORD)

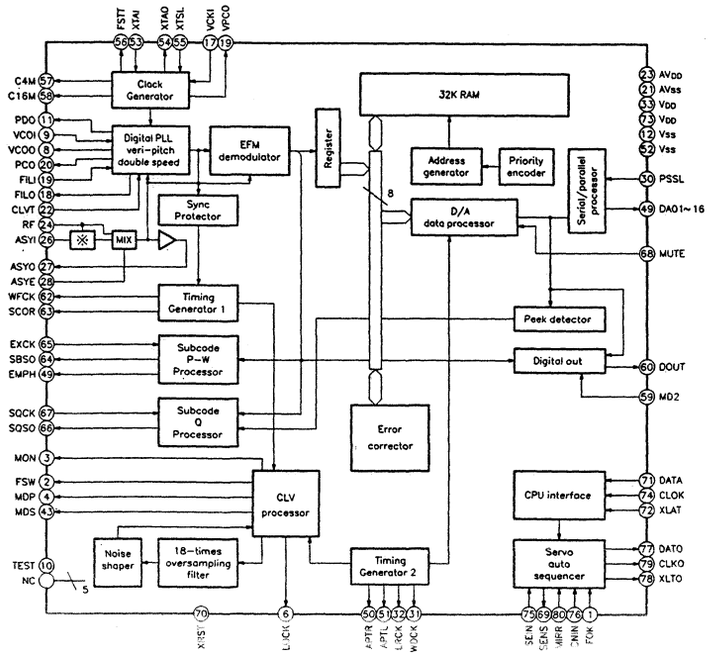


CXD2500AQ

DIGITAL SIGNAL PROCESSOR FOR CD

– TOP VIEW –





※ Asymmetry correction.

Pin Description

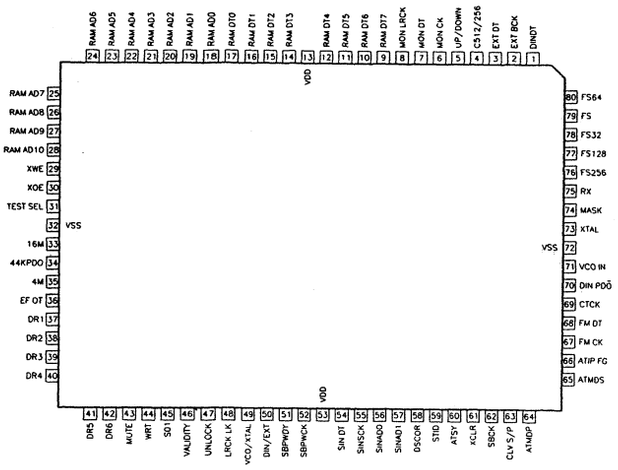
Pin No.	Pin Sign	I/O		Description
1	FOK	I		Focus OK input terminal
2	FSW	O	Z, O	Spindle motor output filter select output
3	MON	O	1, 0	Spindle motor ON-OFF control output
4	MDP	O	1, Z, 0	Spindle motor servo control
5	MDS	O	1, Z, 0	Spindle motor servo control
6	LOCK	O	1, 0	When GFS is High, High output. When GFS is low 8 times continuously, Low output.
7	NC			
8	VCOO	O	1, 0	Analogue EFM PLL oscillating circuit output.
9	VCOI	I		Analogue EFM PLL oscillating circuit input. f_{VCO} = 8.6436MHz
10	TEST	I		Terminal for TEST. Ordinarily connected to GND.
11	PDO	O	1, Z, 0	Analogue EFM PLL charge pump output
12	Vss			GND
13	NC			
14	NC			
15	NC			
16	VPCO	O	1, Z, 0	Vary pitch PLL charge pump output
17	VCKI	I		Clock input f_{CENTER} = 16.9344MHz from external VCO for vary pitch.
18	FILO	O	analogue	Filter output for master PLL (slave = digital PLL)
19	FILI	I		Filter input for master PLL
20	PCO	O	1, Z, 0	Charge pump output for master PLL
21	AVss			Analogue GND
22	CLTV	I		VCO control voltage input for master
23	AVDD			Analogue power supply (+5V)
24	RF	I		EFM signal input
25	BIAS	I		Asaymmetry circuit constant current input
26	ASYI	I		Asaymmetry comparate voltage input
27	ASYO	O	1, 0	EFM full-swing output (L = Vss, H = VDD)
28	ASYE	I		L : Asaymmetry circuit OFF H : Asaymmetry circuit ON
29	NC			
30	PSSL	I		Audio data output mode select input. L : Serial output/H : Parallel output
31	WDCK	O		D/A interface for 48 bit slot
32	LRCK	O		D/A interface for 48 bit slot
33	VDD			Power supply (+5V)
34	DA16	O	1, 0	On PSSL = 1, DA16 (MSB) output. On PSSL = 0, 48 bit slot serial data.
35	DA15	O	1, 0	On PSSL = 1, DA15 output. On PSSL = 0, 48 bit slot bit clock.
36	DA14	O	1, 0	On PSSL = 1, DA14 output. On PSSL = 0, 64 bit slot serial data.
37	DA13	O	1, 0	On PSSL = 1, DA13 output. On PSSL = 0, 64 bit slot bit clock.
38	DA12	O	1, 0	On PSSL = 1, DA12 output. On PSSL = 0, 64 bit slot LR clock.
39	DA11	O	1, 0	On PSSL = 1, DA11 output. On PSSL = 0, GTOP output.
40	DA10	O	1, 0	On PSSL = 1, DA10 output. On PSSL = 0, XUGF ouput.
41	DA09	O	1, 0	On PSSL = 1, DA09 output. On PSSL = 0, XPLCK output.
42	DA08	O	1, 0	On PSSL = 1, DA08 output. On PSSL = 0, GFS output.

Pin No.	Pin Sign	I/O		Description
43	DA07	O	1, 0	On PSSL = 1, DA07 output. On PSSL = 0, RFCK output.
44	DA06	O	1, 0	On PSSL = 1, DA06 output. On PSSL = 0, C2P0 output.
45	DA05	O	1, 0	On PSSL = 1, DA05 output. On PSSL = 0, XRAOF output.
46	DA04	O	1, 0	On PSSL = 1, DA04 output. On PSSL = 0, MNT3 output.
47	DA03	O	1, 0	On PSSL = 1, DA03 output. On PSSL = 0, MNT2 output.
48	DA02	O	1, 0	On PSSL = 1, DA02 output. On PSSL = 0, MNT1 output.
49	DA01	O	1, 0	On PSSL = 1, DA01 output. On PSSL = 0, MNT0 output.
50	APTR	O	1, 0	Aperture correction control output. On Rch, H.
51	APTL	O	1, 0	Aperture correction control output. On Lch, H.
52	Vss			GND
53	XTAI	I		16.9344MHz crystal oscillating circuit input. Or 33.8688MHz input.
54	XTAO	O	1, 0	16.9344MHz crystal oscillating circuit output
55	XTSL	I		Crystal select input terminal. When crystal is 16.9334MHz, it becomes L, when 33.8688MHz, becomes H.
56	FSTT	O	1, 0	2/3 dividing output of Pins 53 and 54. Not changing by vary pitch.
57	C4M	O	1, 0	4.2336MHz output. When pitch is varied, it changes at the same time.
58	C16M	O	1, 0	16.9344MHz output. When pitch is varied, it changes at the same time.
59	MD2	I		Digital-Out ON/OFF control. H : ON, L : OFF
60	DOUT	O	1, 0	Digital-Out output terminal
61	EMPH	O	1, 0	When the playback disc is emphasized, H is out, not emphasized, L is out.
62	WFCK	O	1, 0	WFCK (Write Frame Clock) output
63	SCOR	O	1, 0	When the sub-code sync. S0 or S1 is detected, H is out.
64	SBSO	O	1, 0	SubP to W serial output
65	EXCK	I		SBSO read-out clock input
66	SQSO	O	1, 0	SubQ 80bit and PCM peak level data 16bit output
67	SQCK	I		SQSO read-out clock input
68	MUTE	I		H : Mute on, L : Mute off
69	SENS	–	1, Z, 0	SENS output to CPU
70	XRST	I		System reset. Reset on "L"
71	DATA	I		Serial data input from CPU
72	XLAT	I		Lach input from CPU. Latch serial data on falling edge
73	VDD			Power supply (+5V)
74	CLOK	I		Serial data transfer clock input from CPU
75	SEIN	I		Sense input from SSP
76	CNIN	I		Track jump numbers count signal input
77	DATO	O	1, 0	Serial data output to SSP
78	XLTO	O	1, 0	Serial data latch output to SSP. Latch on falling edge.
79	CLKO	O	1, 0	Serial data transfer clock output to SSP
80	MIRR	I		Miror signal input

CXD2520Q

ENCORDER LSI (CD)

– TOP VIEW –

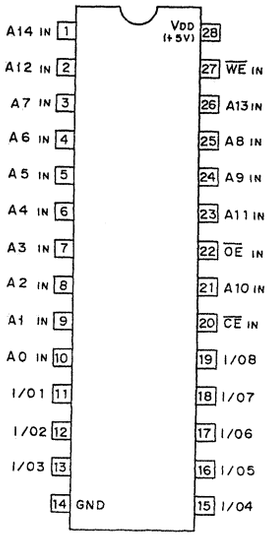


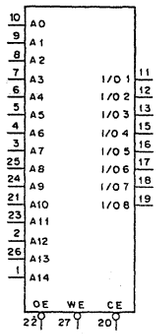
Pin	Symbol	I/O	Pin	Symbol	I/O	Pin	Symbol	I/O
1	DINDT	O	28	RAMAD10	O	55	SINSCK	I
2	EXTBCK	I	29	XWE	O	56	SINADI	I
3	EXTDT	I	30	XOE	O	57	SINADD	I
4	C512/256	I	31	TESTSEL	I	58	DSCOR	O
5	UP/DOWN	I	32	VSS		59	STID	O
6	MONCK	I	33	C16M	I	60	ATSY	O
7	MONDT	O	34	C44KPDO	O	61	XCLR	I
8	MONLRCK	I	35	C4M	O	62	SBCK	O
9	RAMDT7	I/O	36	EFOT	O	63	CLVSP	O
10	RAMDT6	I/O	37	DR1	I/O	64	ATMDP	O
11	RAMDT5	I/O	38	DR2	I/O	65	ATMDS	O
12	RAMDT4	I/O	39	DR3	I/O	66	ATIPFG	I
13	VDD		40	DR4	I/O	67	FMCK	I
14	RAMDT3	I/O	41	DR5	I/O	68	FMDT	I
15	RAMDT2	I/O	42	DR6	I/O	69	CTCK	I
16	RAMDT1	I/O	43	MUTE	I	70	DINPDO	O
17	RAMDT0	I/O	44	WRT	I	71	VCOIN	I
18	RAMAD0	O	45	SDI	O	72	VSS	
19	RAMAD1	O	46	VALIDITY	O	73	XTAL	I
20	RAMAD2	O	47	UNLOCK	O	74	MASK	I
21	RAMAD3	O	48	LRCKLK	O	75	RX	I
22	RAMAD4	O	49	VCO/XTAL	I	76	FS256	O
23	RAMAD5	O	50	DIN/EXT	I	77	FS128	O
24	RAMAD6	O	51	SBPWDT	I	78	FS32	O
25	RAMAD7	O	52	SBPWCK	I	79	FS	O
26	RAMAD8	O	53	VDD		80	FS64	O
27	RAMAD9	O	54	SINDT	I/O			

CXK58257AM-10L (SONY) FLAT PACKAGE

C-MOS 256K (32768x8)-BIT STATIC RAM

– TOP VIEW –

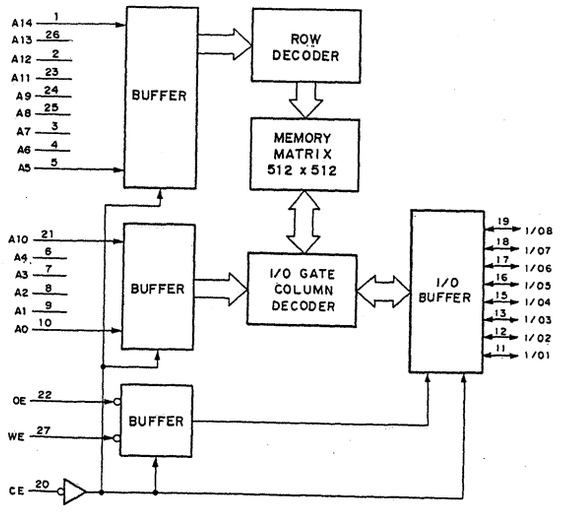




A0 – A14 : ADDRESS INPUTS
CE : CHIP ENABLE INPUT
I/O1 – I/O8 : DATA INPUTS/OUTPUTS
OE : OUTPUT ENABLE INPUT
WE : WRITE ENABLE INPUT

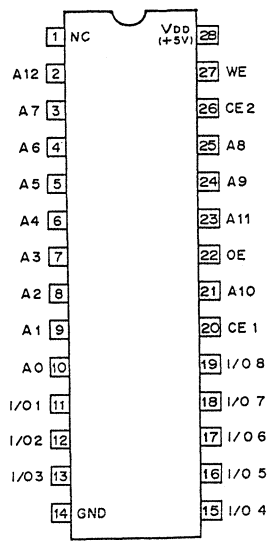
CE	OE	WE	MODE	I/O TERMINAL
1	×	×	NOT SELECT	HIGH IMPEDANCE
0	1	1	OUTPUT DISABLE	HIGH IMPEDANCE
0	0	1	READ	OUTPUT DATA
0	×	0	WRITE	INPUT DATA

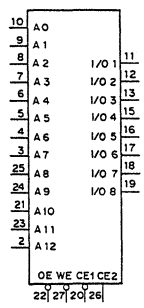
0 : LOW LEVEL
1 : HIGH LEVEL
×: DON'T CARE



CXK5864BM-10L (SONY) FLAT PACKAGE

C-MOS 64K(8192x8)-BIT STATIC RAM
– TOP VIEW –

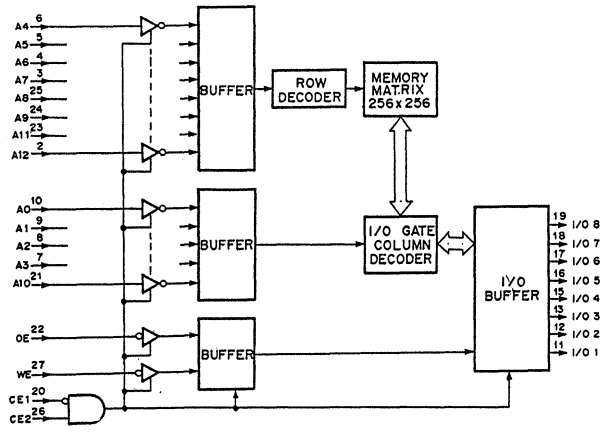




A0-A12 ; ADDRESS INPUT
CE1, CE2 ; CHIP ENABLE INPUT
I/O1-I/O8 ; DATA INPUT/OUTPUT
OE ; OUTPUT ENABLE INPUT
WE ; WRITE ENABLE INPUT

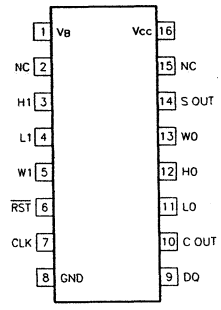
CE1	CE2	OE	WE	MODE	I/O TERMINAL
÷	X	X	X	NOT SELECT	HIGH IMPEDANCE
X	0	X	X	NOT SELECT	HIGH IMPEDANCE
0	1	1	1	OUTPUT DISABLE	HIGH IMPEDANCE
0	1	0	1	READ	OUTPUT DATA
0	1	X	0	WRITE	INPUT DATA

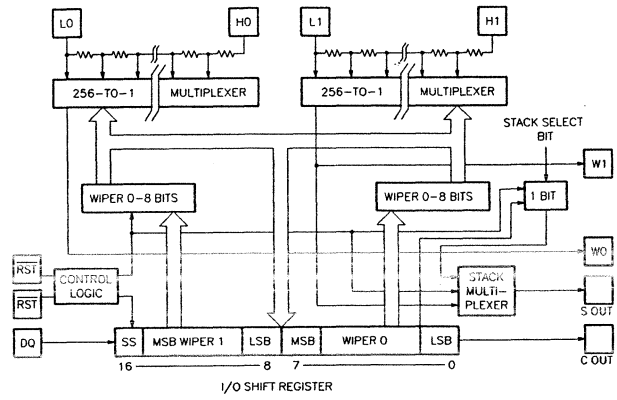
0;LOW LEVEL
1;HIGH LEVEL
X;DON'T CARE



DS1267S-10

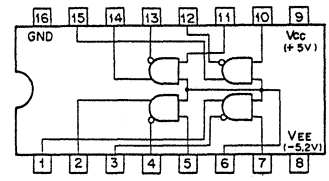
DUAL DIGITAL POTENTIOMETER CHIP
– TOP VIEW –





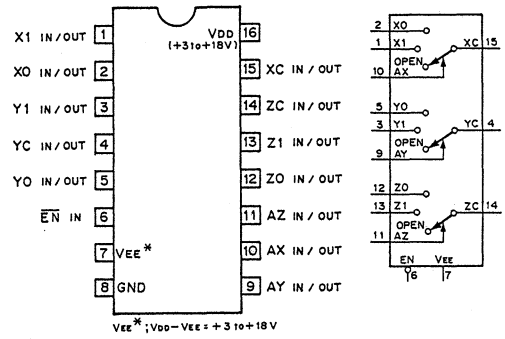
HD10124 (HITACHI)

ECL TTL-TO-ECL TRANSLATOR
– TOP VIEW –



HD14053BFP (HITACHI) FLAT PACKAGE

C-MOS TRIPLE 2-CHANNEL ANALOG MULTIPLEXERS/DEMULTIPLEXERS
– TOP VIEW –



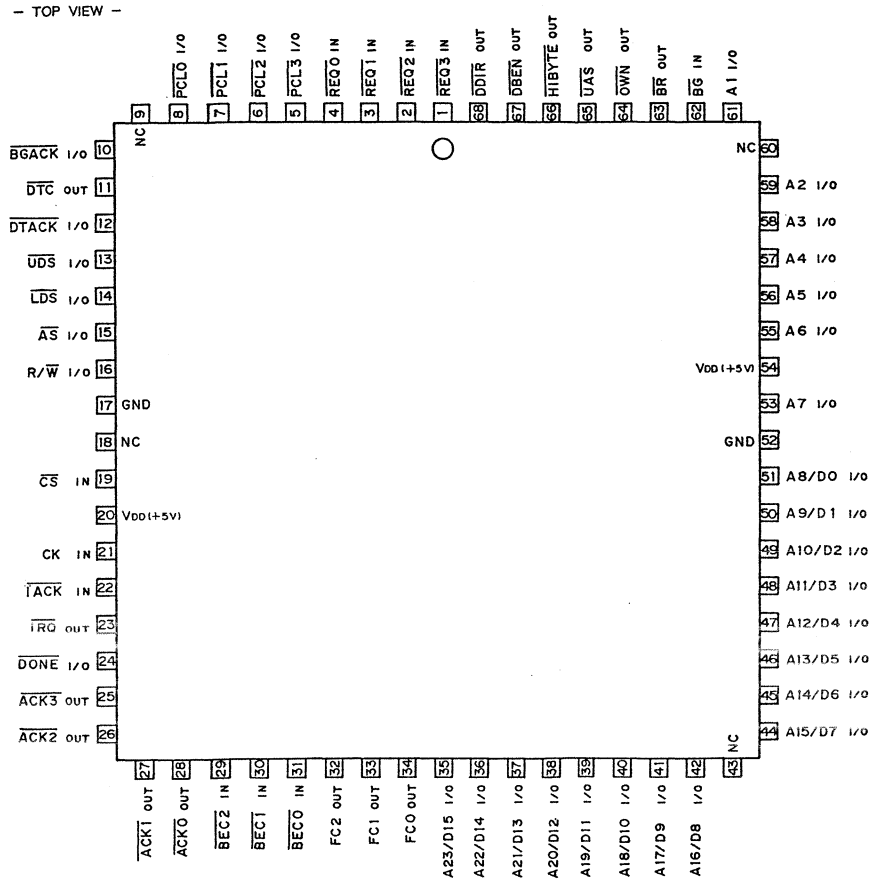
CONT. INPUTS		ON
EN	A (X,Y,Z,)	CHANNEL
0	0	0
0	1	1
1	X	OPEN

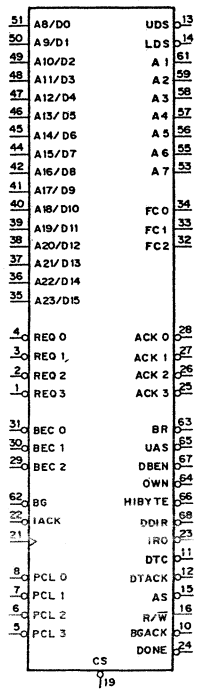
0; LOW LEVEL
1; HIGH LEVEL
X; DON'T CARE.

HD63450CP10 (10MHz) (HITACHI)

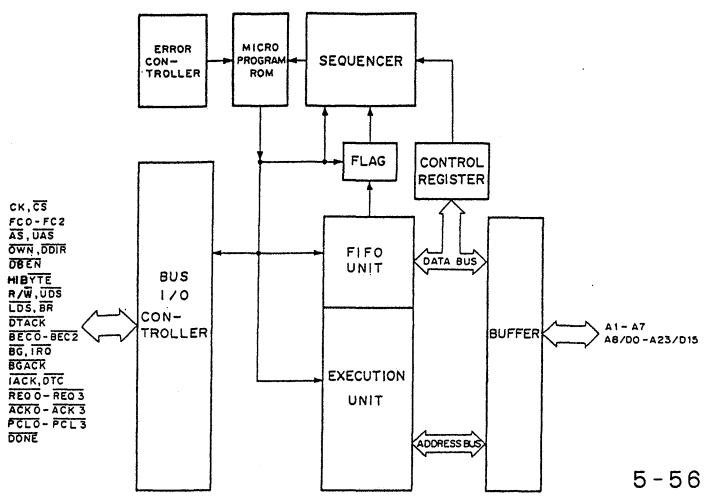
C-MOS DIRECT MEMORY ACCESS CONTROLLER

– TOP VIEW –



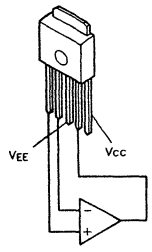


A1 – A7 : 3-STATE ADDRESS BUS INPUTS/OUTPUTS
A8/D0 – A23/D15 : ADDRESS/DATA BUS INPUTS/OUTPUTS
FC0 – FC2 : 3-STATE FUNCTION CODE OUTPUTS
$\overline{CS}$: CHIP SELECT INPUT
$\overline{AS}$: ADDRESS STROBE INPUT/OUTPUT
$\overline{UAS}$: 3-STATE UPPER ADDRESS OUTPUT
$\overline{DDIR}$: 3-STATE DATA DIRECTION OUTPUT
$\overline{DBEN}$: 3-STATE DATA BUS ENABLE OUTPUT
$\overline{UDS}$: 3-STATE UPPER DATA STROBE INPUT/OUTPUT
$\overline{LDS}$: 3-STATE LOWER DATA STROBE INPUT/OUTPUT
$\overline{DTACK}$: DATA TRANSFER ACKNOWLEDGE INPUT/OUTPUT
$\overline{BEC0}$ – $\overline{BEC2}$: BUS EXCEPTION CONTROL INPUTS
$\overline{BR}$: BUS REQUEST OUTPUT
$\overline{BG}$: BUS GRANT INPUT
$\overline{BGACK}$: 3-STATE BUS GRANT ACKNOWLEDGE INPUT/OUTPUT
$\overline{IRQ}$: INTERRUPT REQUEST OUTPUT
$\overline{IACK}$: INTERRUPT ACKNOWLEDGE INPUT
$\overline{REQ0}$ – $\overline{REQ3}$: CHANNEL REQUEST INPUTS
$\overline{ACK0}$ – $\overline{ACK3}$: CHANNEL ACKNOWLEDGE OUTPUTS
$\overline{PCL0}$ – $\overline{PCL3}$: 3-STATE PERIPHERAL CONTROL INPUTS/OUTPUTS
$\overline{DTC}$: 3-STATE DATA TRANSFER COMPLETE



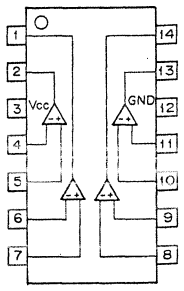
LA6501

– TOP VIEW –



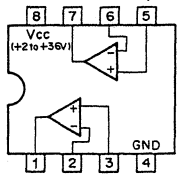
LM2901M (MOTOROLA)

SINGLE SUPPLY COMPARATOR
– TOP VIEW –



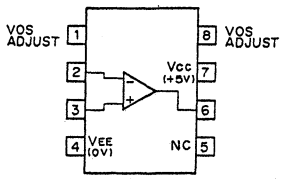
LM2903M (RAYTHEON) FLAT PACKAGE

DUAL VOLTAGE COMPARATORS
– TOP VIEW –



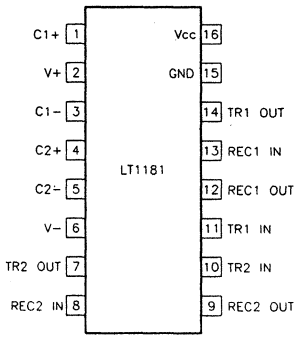
LM6361M (NEC)

HIGH SPEED OPERATIONAL AMPLIFIER
– TOP VIEW –

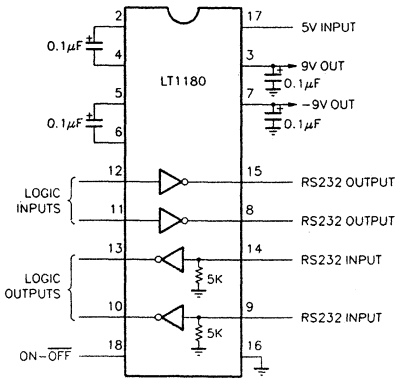


LT1181CS

RS232 DUAL DRIVER/RECEOVER
– TOP VIEW –

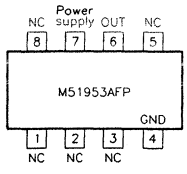


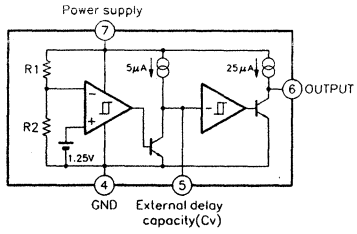
S PACAGE
16-LEAD PLASTIC SOL



M51953AFP

– TOP VIEW –

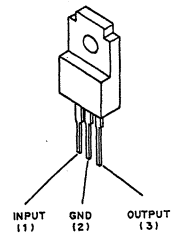


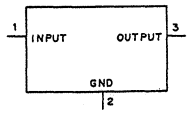


Pins ①②③and⑧:not connected

M5F78M05L (MITSUBISHI) +5V

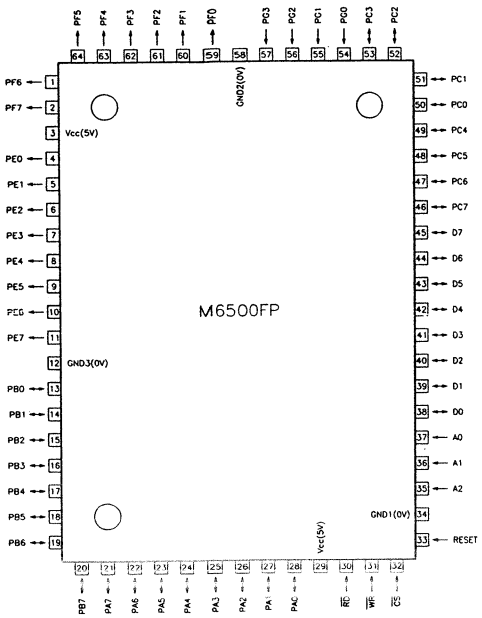
POSITIVE VOLTAGE REGULATOR
– FRONT VIEW –

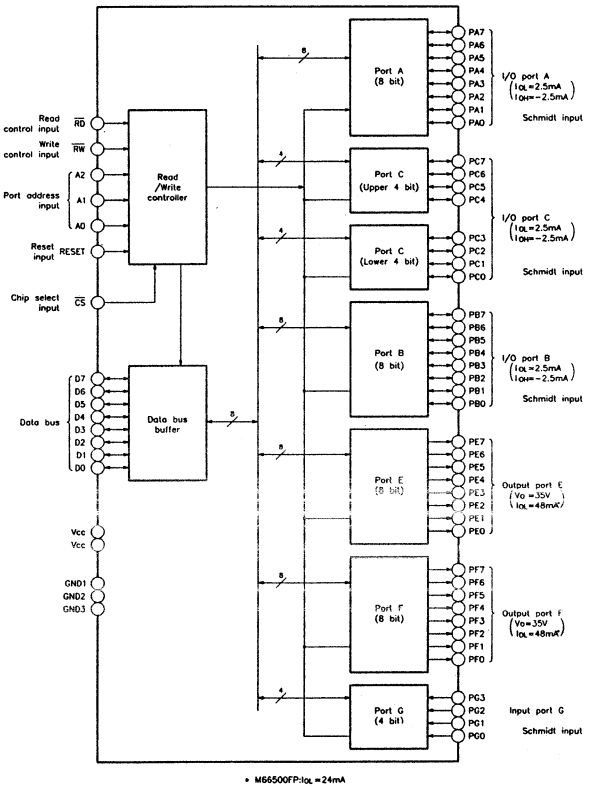




M66500FP

PROGRAMMABLE BUFFERED
I/O EXPANDER
— TOP VIEW —


M6500FP
PF5 PF4 PF3 PF2 PF1 PF0 PG3 PG2 PG1 PG0 PC3 PC2
PF6 PF7 Vcc(5V) PE0 PE1 PE2 PE3 PE4 PE5 PE6 PE7 GND3(0V) PB0 PB1 PB2 PB3 PB4 PB5 PB6
GND2(0V)
PC1 PC0 PC4 PC5 PC6 PC7 D7 D6 D5 D4 D3 D2 D1 D0 A0 A1 A2 GND1(0V) RESET
PB7 PA7 PA6 PA5 PA4 PA3 PA2 PA1 PA0 RE WR CS
Vcc(5V)

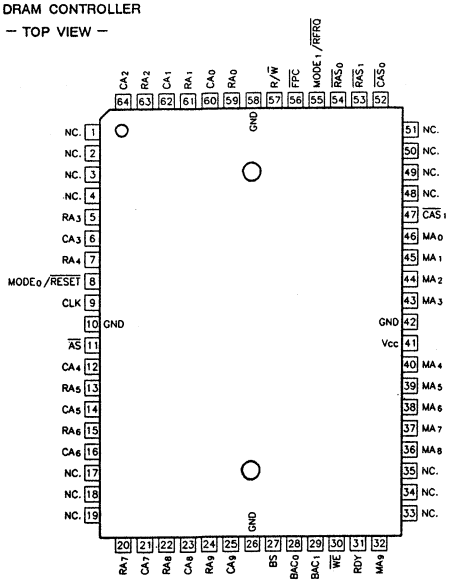

Read control input RD
Write control input R/W
Port address input A2 A1 A0
Reset input RESET
Chip select input CS
Data bus D7 D6 D5 D4 D3 D2 D1 D0
Vcc Vcc
GND1 GND2 GND3
Read /Write controller
Data bus buffer
Port A (8 bit)
Port C (Upper 4 bit)
Port C (Lower 4 bit)
Port B (8 bit)
Port E (8 bit)
Port F (8 bit)
Port G (4 bit)
PA7 PA6 PA5 PA4 PA3 PA2 PA1 PA0
I/O port A (IOL=2.5mA IOH=−2.5mA) Schmidt input
PC7 PC6 PC5 PC4
I/O port C (IOL=2.5mA IOH=−2.5mA)
PC3 PC2 PC1 PC0
Schmidt input
PB7 PB6 PB5 PB4 PB3 PB2 PB1 PB0
I/O port B (IOL=2.5mA IOH=−2.5mA) Schmidt input
PE7 PE6 PE5 PE4 PE3 PE2 PE1 PE0
Output port E (Vo =35V IOL=48mA)
PF7 PF6 PF5 PF4 PF3 PF2 PF1 PF0
Output port F (Vo=35V IOL=48mA)
PG3 PG2 PG1 PG0
Input port G Schmidt input
* M66500FP:IOL =24mA

A2	A1	A0	CS	RD	WR	Function
0	0	0	0	0	1	Data bus ← Port A
0	0	1	0	0	1	Data bus ← Port B
0	1	0	0	0	1	Data bus ← Port C
0	1	1	0	0	1	Data bus ← Port G
1	0	0	0	0	1	Data bus ← Port E latch data
1	0	1	0	0	1	Data bus ← Port F latch data
0	0	0	0	1	↓	Port A ← Data bus
0	0	1	0	1	↓	Port B ← Data bus
0	1	0	0	1	↓	Port C ← Data bus
1	0	0	0	1	↓	Port E ← Data bus
1	0	1	0	1	↓	Port F ← Data bus
1	1	1	0	1	↓	Control register ← Data bus
X	X	X	1	X	X	Databus is in high impedance conndition

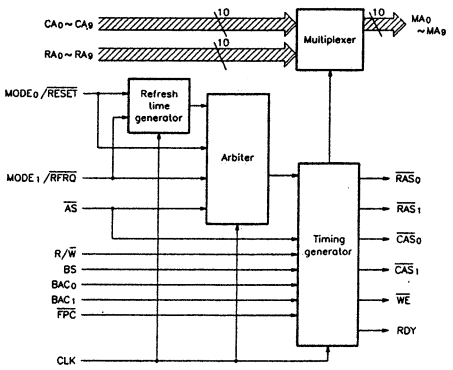
Note) "0" : Low level
"1" : High level

MB1431A

DRAM CONTROLLER
— TOP VIEW —

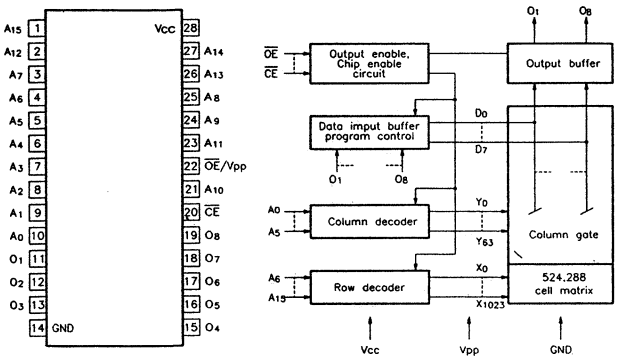

CA2 RA2 CA1 RA1 CA0 RA0 R/W FPC MODE1/RFRQ RAS0 RAS1 CAS0
NC. NC. NC. NC. RA3 CA3 RA4 MODE0/RESET CLK GND AS CA4 RA5 CA5 RA6 CA6 NC. NC. NC.
NC. NC. NC. NC. CAS1 MA0 MA1 MA2 MA3 GND Vcc MA4 MA5 MA6 MA7 MA8 NC. NC. NC.
RA7 CA7 RA8 CA8 RA9 CA9 BS BAC0 BAC1 WE RDY MA9

Symbol	Description	I/O
RA0 ~ RA9	Row Address	I
CA0 ~ CA9	Column Address	I
MA0 ~ MA9	Memory Address	O
MODE0 / RESET	Ext. /Int. Ref. Select	I
MODE1 / RFRQ	Ext. Ref. Request/Ref. Interval Select	I
AS	Addresss Strobe	I
R/W	Read Write Control	I
CLK	CLOCK	I
RAS0, RAS1	Row Address Strobe	O
CAS0, CAS1	Column Address Storobe	O
WE	Write Enable	O
RDY	Ready	O
FPC	Fast Page Mode Control	I
BS	Bank Select	I
BAC0, BAC1	Byte Access Control	I



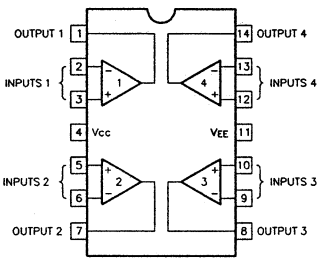
MBM27C512P-E1615A
MBM27C512P-E1616B
MBM27C512P-E1617C

512K (64 x 8) BIT CMOS MEMORY
OTPROM
— TOP VIEW —



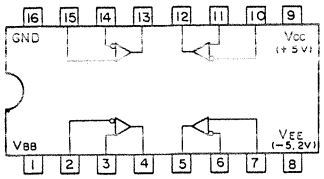
MC34084DW

HIGH PERFORMANCE JFET-INPUT
OPERATIONAL AMPLIFIER
— TOP VIEW —



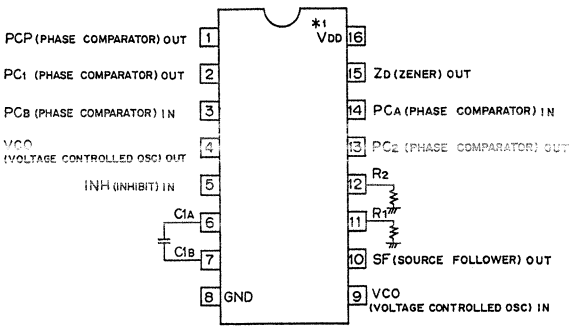
MC10H125M (MOTOROLA) FLAT PACKAGE

ECL ECL-TO-TTL TRANSLATOR
— TOP VIEW —



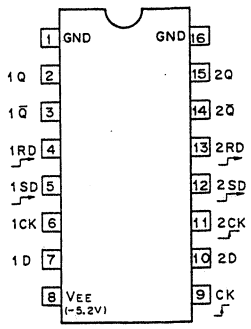
MC74HC4046AN (MOTOROLA)

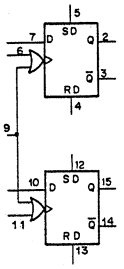
C-MOS PHASE LOCKED LOOP
— TOP VIEW —



MC10H131M (MOTOROLA) FLAT PACKAGE

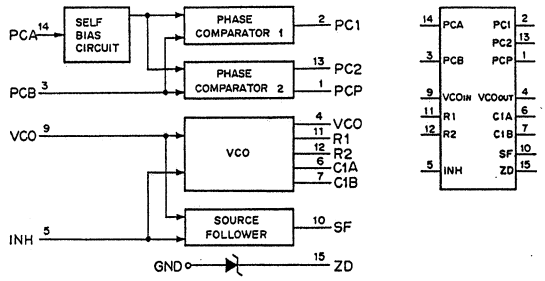
ECL D-TYPE FLIP FLOP
— TOP VIEW —





INPUTS				OUTPUTS	
SD	RD	CK	D	Qn+1	Q̄n+1
1	0	X	X	1	0
0	1	X	X	0	1
1	1	X	X	ND	ND
0	0	↑	1	1	0
0	0	↑	0	0	1
0	0	0	X	Qn	Q̄n

0 ; LOW LEVEL
1 ; HIGH LEVEL
X ; DON'T CARE
ND ; NOT DEFINED

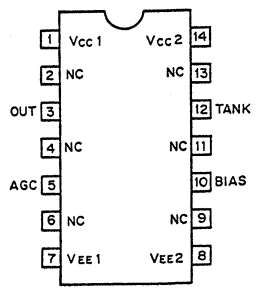


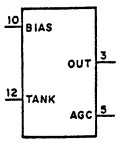
*1

TYPE	VDD
CD4046BE HD14046BP MC14046BCP MC14046BF TC4046BP	+3 to +8V
MC74HC4046AN	+2 to +6V

MC1648P-1

ECL VOLTAGE CONTROLLED OSCILLATOR
— TOP VIEW —

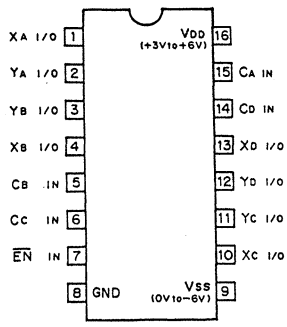


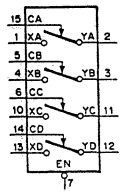


Supply Voltage	Supply Pins	GND Pins
+5.0Vdc	1,14	7,8
-5.2Vdc	7,8	1,14

MC74HC4316F

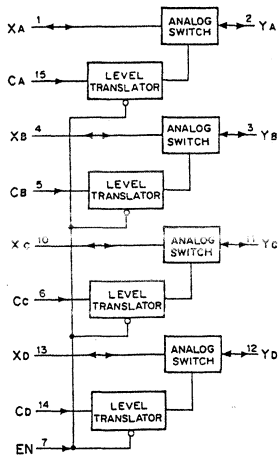
C-MOS QUAD ANALOG SWITCH
— TOP VIEW —





INPUTS		STATE OF ANALOG SWITCH
$\overline{EN}$	C	
0	1	ON
0	0	OFF
1	X	OFF

0 ; LOW LEVEL
1 ; HIGH LEVEL
X ; DON'T CARE

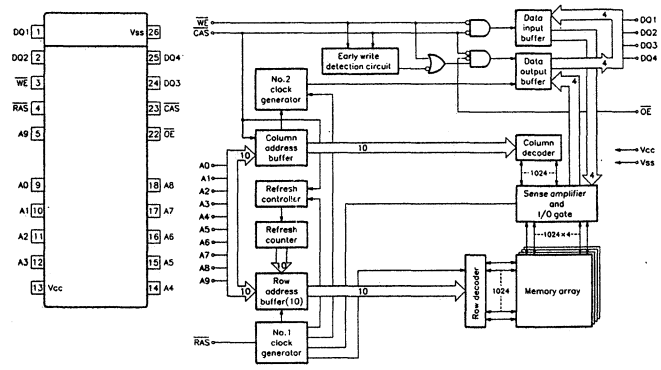


CA−CD ; ON/OFF CONTROL INPUT
$\overline{EN}$; ENABLE INPUT
XA−XD ; ANALOG SIGNAL I/O
YA−YD ; ANALOG SIGNAL I/O

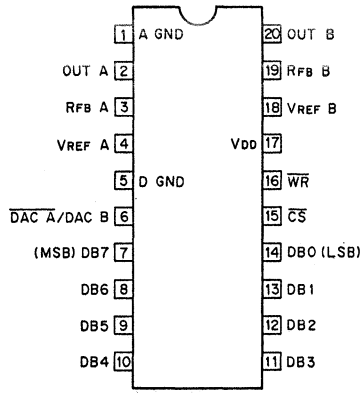
Function		$\overline{RAS}$	$\overline{CAS}$	$\overline{WE}$	Adress 'R	Adress 'C	$\overline{OE}$	Data I/O DQ1 − 4 (I/O)
Standby		H	X	X	X	X	X	High impedance
Read		L	L	H	ROW	COL	L	Effective data output
Early write		L	L	L	ROW	COL	H	Effective data input
Read write		L	L	H→L	ROW	COL	L→H	Effective data output, Effective data input
Page mode read	1st cycle	L	H→L	H	ROW	COL	L	Effective data output
	2nd cycle	L	H→L	H	n/s	COL	L	Effective data output
Page mode write	1st cycle	L	H→L	L	ROW	COL	X	Effective data input
	2nd cycle	L	H→L	L	n/s	COL	X	Effective data input
Page mode read write	1st cycle	L	H→L	H→L	ROW	COL	L→H	Effective data output, Effective data input
	2nd cycle	L	H→L	H→L	n/s	COL	L→H	Effective data output, Effective data input
$\overline{RAS}$ only refresh		L	H	X	ROW	n/s	X	High impedance
Hidden refresh	Read	L→H→L	L	H	ROW	COL	L	Effective data output
	Write	L→H→L	L	L	ROW	COL	X	Effective data input
$\overline{CAS}$ before $\overline{RAS}$ refresh	Standard	H→L	L	L	X	X	X	High impedance
	"J" option	H→L	L	H	X	X	X	High impedance

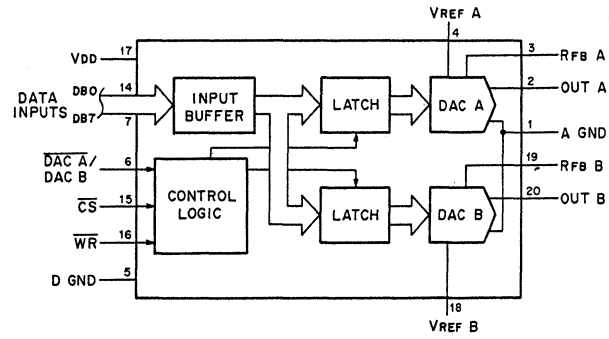
MT4C4001JDJ-8

1 MEG x 4 DRAM
— TOP VIEW —



MX7528KCWP (MAXIM) FLAT PACKAGE
C-MOS DUAL 8BIT D/A CONVERTER
— TOP VIEW —

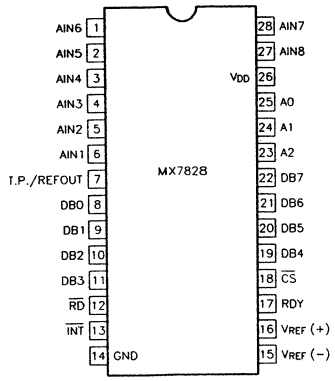


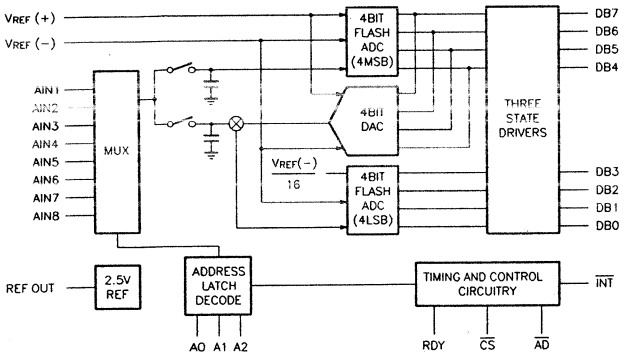


MX7828LCWI

CMOS HIGH-SPEED 8 BIT A/D CONVERTER

— TOP VIEW —





Pin	Symbol	Description
1	AIN6	Analog input channel 6
2	AIN5	Analog input channel 5
3	AIN4	Analog input channel 4
4	AIN3	Analog input channel 3
5	AIN2	Analog input channel 2
6	AIN1	Analog input channel 1
7	N.C.	No Connect
8	DB0	Three-state data output, bit 0 (LSB)
9	DB1	Three-state data output, bit 1
10	DB2	Three-state data output, bit 2
11	DB3	Three-state data output, bit 3
12	RD	READ input. RD controls conversions and data access. See Digital Interface section.
13	INT	INTERRUPT output. INT going low indicates the completion of a conversion. See Digital Interface section.
14	GND	Ground
15	VREF (−)	Lower limit of reference span. Sets the zero code voltage. Range : GND to VREF (+)
16	VREF (+)	Upper limit of reference span. Sets the Full Scale input voltage. Range : VREF (−) to VDD.
17	RDY	READY Output. Open drain output with no active pull-up device. Goes low when CS goes low and high impedance at the end of a conversion.
18	CS	CHIP-SELECT input. CS must be low for the device be selected.
19	DB4	Three-state data output, bit 4
20	DB5	Three-state data output, bit 5
21	DB6	Three-state data output, bit 6
22	DB7	Three-state data output, bit 7 (MSB)
23	A2	Channel Address 2 input
24	A1	Channel Address 1 input
25	A0	Channel Address 0 input
26	VDD	Power supply voltage, +5V
27	AIN8	Analog input channel 8
28	AIN7	Analog input channel 7

NCR53C96

ADVANCED SCSI CONTROLLER

— TOP VIEW —

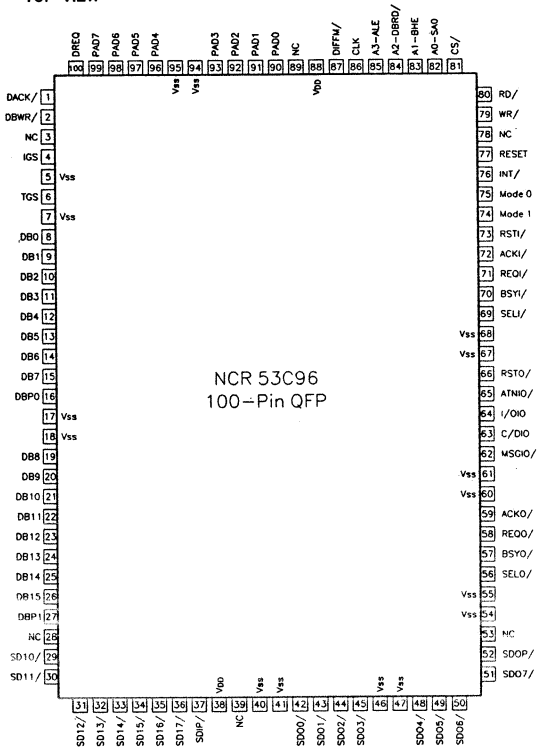


Table 2. Microprocessor and DMA Interface Pins

Signal	Type	Signal	Type
PAD7 - 0	B	CS/	I
DB15 - 0	B	RD/	I
DBP1	B	WR/	I
DBP0	B	INT/	O
3-ALE, A2-DBRD/	I	DREQ	O
		DACK/	I
A1-BHE, A0-SA0	I	RESET	I
		CLK	I
DBWR/	I		

Table 3. SCSI Pins

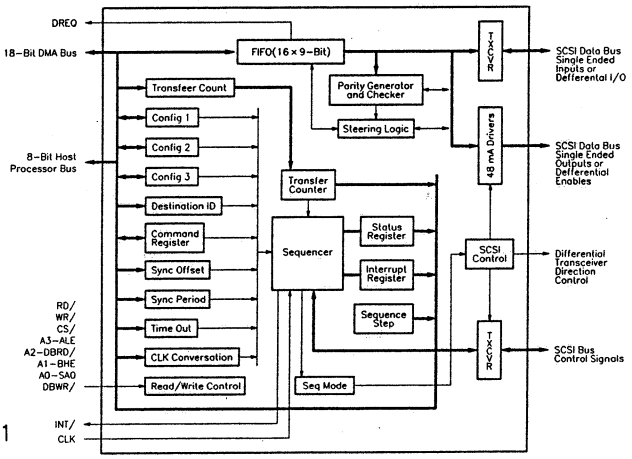
Signal	Type	Signal	Type
SDO7/ - 0/, SDOP/	O	ATNIO/	B
		MSGIO/,	B
SDI7/ - 0/, SDIP	B	C/DIO, I/OIO	
BSYO/, SELO/, RSTO/	O	BSYI, SELI/, RSTI/,	I
REQO/	O	ACKI/,	
ACKO/	O	REQI/	

Table 4. Transceiver Control Pins

Signal	Type
IGS	O
TGS	O

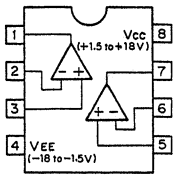
Table 5. Configuration Pins

Mode1	Mode2	Register Address	Register Data	DMA Width	Configuration
0	0	A3-A0	DB	8	Single bus, 8-bit processor, 8-bit DMA
0	1	A3-A0	DB	16	Single bus, 8-bit processor, 16-bit DMA
1	0	PAD3-0	PAD	16	Dual bus, multiplexed, byte control
1	1	A3-A0	PAD	16	Dual bus, 8-bit processor, 16-bit DMA



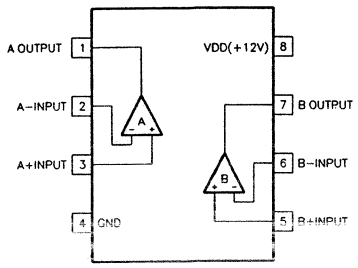
NJM082M (JRC) FLAT PACKAGE

OPERATIONAL AMPLIFIER
(JFET INPUT)
– TOP VIEW –



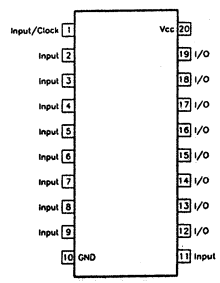
NJM3404AM
RC3404AM

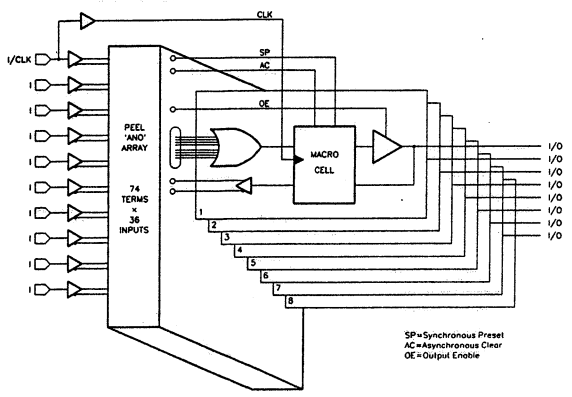
DUAL SINGLE SUPPLY OPERATIONAL AMPLIFIER
– TOP VIEW –



PEEL18CV8-W509F
PEEL18CV8PC-W1D5
PEEL18CV8-W504F3
PEEL18CV8SC-E1104B
PEEL18CV8SC-E1113
PEEL18CV8SC-E1114B
PEEL18CV8SC-E1115
PEEL18CV8SC-E1205C
PEEL18CV8SC-E1206B
PEEL18CV8SC-E1212D
PEEL18CV8SC-E1302B
PEEL18CV8SC-E1402C
PEEL18CV8SC-E1605
PEEL18CV8SC-E1606
PEEL18CV8SC-E1607B
PEEL18CV8SC-E1608
PEEL18CV8SC-E1620B
PEEL18CV8SC-E1702
PEEL18CV8SC-E1703B
PEEL18CV8SC-E1708B
PEEL18CV8SC-E1805B
PEEL18CV8SC-E1806
PEEL18CV8SC-W703

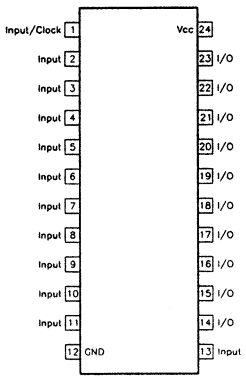
CMOS E² PROGRAMMABLE LOGIC
– TOP VIEW –

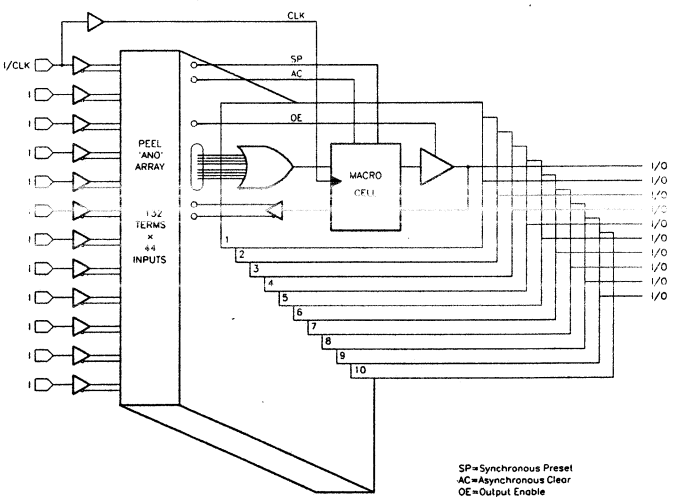




PEEL22CV10-W510F
PEEL22CV10-W728C

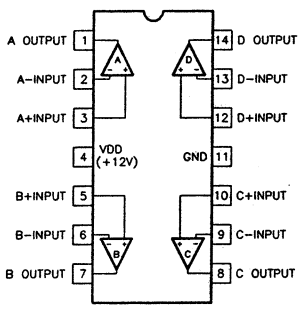
CMOS E² PROGRAMMABLE LOGIC
– TOP VIEW –





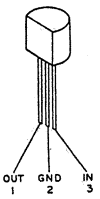
RC3403AM

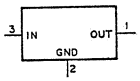
QUAD SINGLE SUPPLY OPERATIONAL AMPLIFIER
– TOP VIEW –



RC78L05A (RAYTHEON) +5V (100mA)

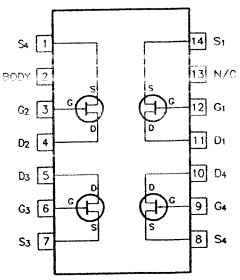
POSITIVE VOLTAGE REGULATOR





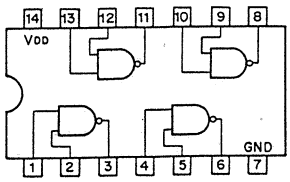
SD5400CY

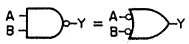
N-CHANNEL LATERAL DMOS QUAD FET
– TOP VIEW –



SN74HC00ANS (TI) FLAT PACKAGE

C-MOS QUAD 2-INPUT NAND GATES
– TOP VIEW –





A	B	Y
0	0	1
0	1	1
1	0	1
1	1	0

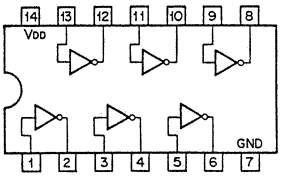
0;LOW LEVEL
1;HIGH LEVEL

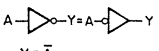
NOTE :

TYPE	VDD
TC74AC00 TYPE	+2 to +5.5V
MC74HCT00N	+5V
74ACT00 TYPE	+4.5 to +5.5V
OTHER TYPES	+2 to +6V

SN74HC04ANS (TI) FLAT PACKAGE
SN74HCU04ANS (TI) FLAT PACKAGE

C-MOS HEX INVERTERS
– TOP VIEW –





A	Y
0	1
1	0

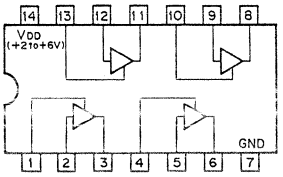
0:LOW LEVEL
1:HIGH LEVEL

NOTE :

TYPE	VDD
74HCT04 TYPE	+5V
TC74AC04 TYPE	+2 to +5.5V
74ACT04 TYPE	+4.5 to +5.5V
OTHER TYPES	+2 to +6V

SN74HC126ANS (TI) FLAT PACKAGE

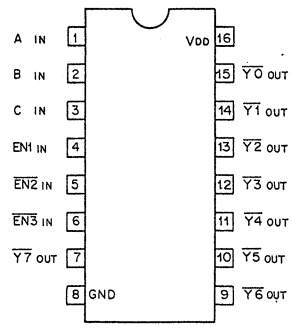
C-MOS BUS BUFFER GATE WITH 3-STATE OUTPUT
– TOP VIEW –

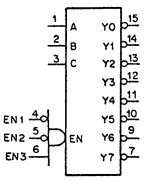


G	A	Y	
0	1	1	0; LOW LEVEL
1	1	1	1; HIGH LEVEL
1	0	0	X; DON'T CARE
0	X	HI-Z	HI-Z; HIGH IMPEDANCE

SN74HC138ANS (TI) FLAT PACKAGE

C-MOS 3-TO-8 LINE DECODER/DEMULTIPLEXER
– TOP VIEW –





INPUTS				OUTPUTS							
EN	C	B	A	Y7	Y6	Y5	Y4	Y3	Y2	Y1	Y0
0	X	X	X	1	1	1	1	1	1	1	1
1	0	0	0	1	1	1	1	1	1	1	0
1	0	0	1	1	1	1	1	1	1	0	1
1	0	1	0	1	1	1	1	1	0	1	1
1	0	1	1	1	1	1	1	0	1	1	1
1	1	0	0	1	1	1	0	1	1	1	1
1	1	0	1	1	1	0	1	1	1	1	1
1	1	1	0	1	0	1	1	1	1	1	1
1	1	1	1	0	1	1	1	1	1	1	1

EN = $\overline{EN1} \cdot \overline{EN2} \cdot EN3$

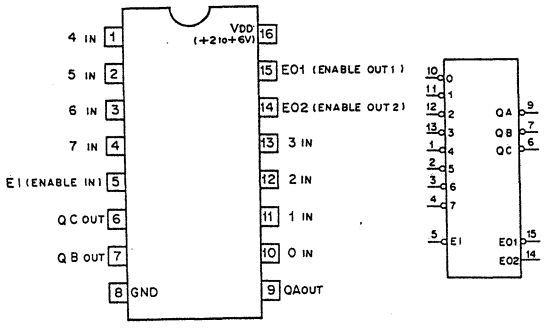
0 ; LOW LEVEL
1 ; HIGH LEVEL
X ; DON'T CARE

NOTE :

TYPE	VDD
74HCT138 TYPE	+5V
74ACT138 TYPE	+4.5 to +5.5V
TC74AC138 TYPE	+2 to +5.5V
OTHER TYPES	+2 to +6V

SN74HC148NS (TI) FLAT PACKAGE

C-MOS 8-TO-3-LINE PRIORITY ENCODER
– TOP VIEW –

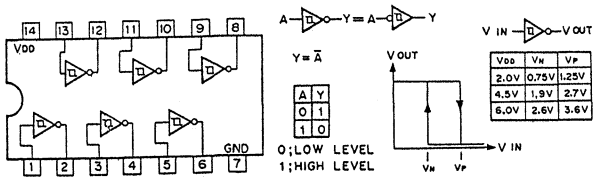


INPUTS								OUTPUTS				
EI	7	6	5	4	3	2	1	0	QC	QB	QA	EO1	EO2
1	X	X	X	X	X	X	X	X	1	1	1	1	1
0	1	1	1	1	1	1	1	1	1	1	1	0	1
0	1	1	1	1	1	1	1	0	1	1	1	1	0
0	1	1	1	1	1	1	0	X	1	1	0	1	0
0	1	1	1	1	1	0	X	X	1	0	1	1	0
0	1	1	1	1	0	X	X	X	1	0	0	1	0
0	1	1	1	0	X	X	X	X	0	1	1	1	0
0	1	1	0	X	X	X	X	X	0	1	0	1	0
0	1	0	X	X	X	X	X	X	0	0	1	1	0
0	0	X	X	X	X	X	X	X	0	0	0	1	0

0;LOW LEVEL 1;HIGH LEVEL X;DON'T CARE

SN74HC14ANS (TI) FLAT PACKAGE

C-MOS HEX SCHMITT TRIGGER INVERTERS
– TOP VIEW –



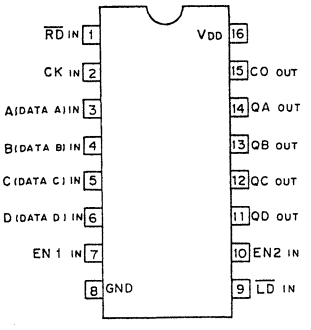
VDD	VH	VP
2.0V	0.75V	1.25V
4.5V	1.9V	2.7V
6.0V	2.6V	3.6V

NOTE :

TYPE	VDD
TC74AC14 TYPE	+2 to +5.5V
OTHER TYPES	+2 to +6V

SN74HC163ANS (TI) FLAT PACKAGE

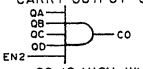
C-MOS PRESETTABLE SYNCHRONOUS 4-BIT BINARY COUNTER
– TOP VIEW –



MODE SELECTION

CONTROL INPUTS				MODE
RD	LD	EN1	EN2	
0	X	X	X	RESET (SYNCHRONOUS)
1	0	X	X	PRESET (SYNCHRONOUS)
↓	1	0	X	NO COUNT
1	1	X	0	NO COUNT
1	1	1	1	COUNT

CARRY OUTPUT "CO"



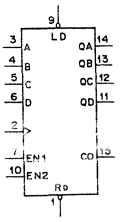
CO IS HIGH WHEN EN2 INPUT IS HIGH AND COUNT IS "15".

NOTE :

TYPE	VDD
74ACT163 TYPE	+4.5 to +5.5V
TC74AC163 TYPE	+2 to +5.5V
OTHER TYPES	+2 to +6V

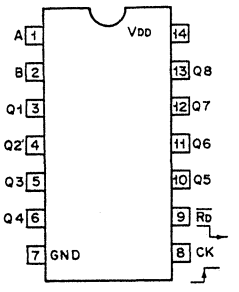
COUNT SEQUENCE

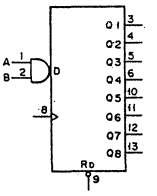
COUNT	OUTPUTS			
	QD	QC	QB	QA
0	0	0	0	0
1	0	0	0	1
2	0	0	1	0
3	0	0	1	1
4	0	1	0	0
5	0	1	0	1
6	0	1	1	0
7	0	1	1	1
8	1	0	0	0
9	1	0	0	1
10	1	0	1	0
11	1	0	1	1
12	1	1	0	0
13	1	1	0	1
14	1	1	1	0
15	1	1	1	1



SN74HC164NS (TI) FLAT PACKAGE

C-MOS 8-BIT SERIAL-IN/PARALLEL-OUT SHIFT REGISTER
– TOP VIEW –



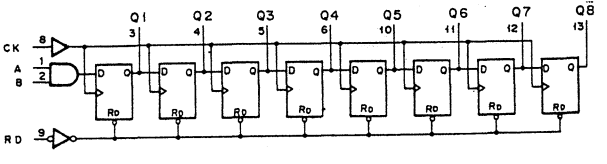


INPUTS				OUTPUTS			
RD	CK	A	B	Q1	Q2	----	Q8
0	X	X	X	0	0	0	0
1	0	X	X	Q1o	Q2o	----	Q8o
1	↑	1	1	1	Q1n	----	Q7n
1	↑	0	X	0	Q1n	----	Q7n
1	↑	X	0	0	Q1n	----	Q7n

0;LOW LEVEL
1;HIGH LEVEL
X;DON'T CARE

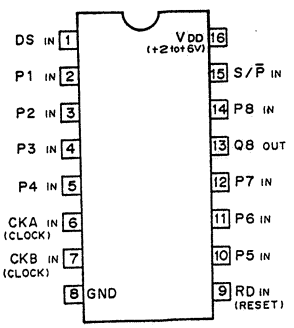
NOTE :

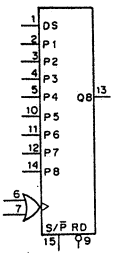
TYPE	VDD
TC74AC164 TYPE	+2 to +5.5V
OTHER TYPES	+2 to +6V



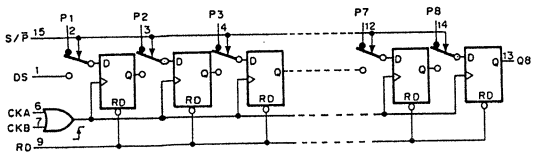
SN74HC166ANS (TI) FLAT PACKAGE

C-MOS 8-BIT SHIFT REGISTER
– TOP VIEW –





DS : DATA SERIAL INPUT
PI – P8 : DATA PARALLEL INPUT
CK : CLOCK



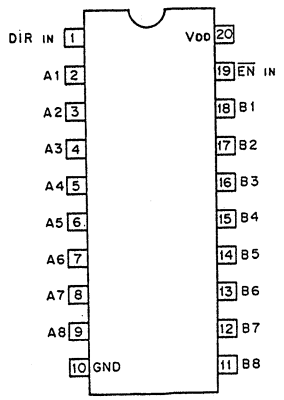
CKA	CKB	CK
0	0	0
X	1	1
1	X	1
1	↓	1
↓	1	1
0	↓	↓
↓	0	↓

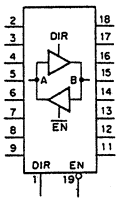
INPUT						OUTPUT
RD	S/P	CK	DS	PI-P8		Q8
0	X	X	X	X		0
1	X	0	X	X		$Q8_0$
1	0	↓	X	1-8		8
1	1	↓	1	X		$Q7_n$
1	1	↓	0	X		$Q7_n$
1	X	↓	X	X		$Q8_0$

0 ; LOW LEVEL
1 ; HIGH LEVEL
X ; DON'T CARE

SN74HC245ANS (TI) FLAT PACKAGE

C-MOS BILATERAL BUS TRANSCEIVERS WITH 3-STATE OUTPUTS
– TOP VIEW –



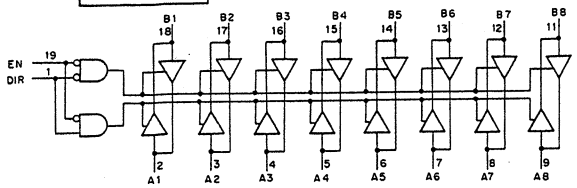


EN	DIR	OPERATION
0	0	B to A
0	1	A to B
1	X	HI – Z

0 ; LOW LEVEL
1 ; HIGH LEVEL
X ; DON'T CARE
HI-Z ; HIGH IMPEDANCE

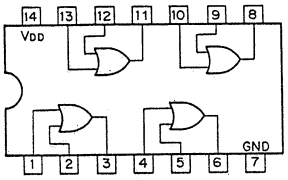
NOTE :

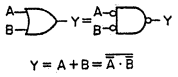
TYPE	VDD
AC HC	+2 to +6V
ACT HCT	+5V
TC74AC245F TC74AC245P	+2 to +5.5V



SN74HC32ANS (TI) FLAT PACKAGE

C-MOS QUAD 2-INPUT OR GATES
– TOP VIEW –





A	B	Y
0	0	0
0	1	1
1	0	1
1	1	1

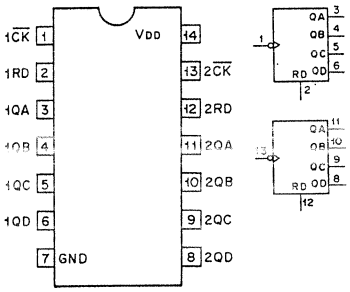
0 ; LOW LEVEL
1 ; HIGH LEVEL

NOTE :

TYPE	VDD
TC74AC32 TYPE	+2 to +5.5V
OTHER TYPES	+2 to +6V

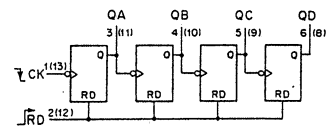
SN74HC393ANS (TI) FLAT PACKAGE

C-MOS DUAL 4-BIT BINARY COUNTER
– TOP VIEW –



COUNT	QD	QC	QB	QA
0	0	0	0	0
1	0	0	0	1
2	0	0	1	0
3	0	0	1	1
4	0	1	0	0
5	0	1	0	1
6	0	1	1	0
7	0	1	1	1
8	1	0	0	0
9	1	0	0	1
10	1	0	1	0
11	1	0	1	1
12	1	1	0	0
13	1	1	0	1
14	1	1	1	0
15	1	1	1	1

COUNT SEQUENCE



RESET/COUNT FUNCTION				
RD	QD	QC	QB	QA
1	0	0	0	0
0	COUNT			

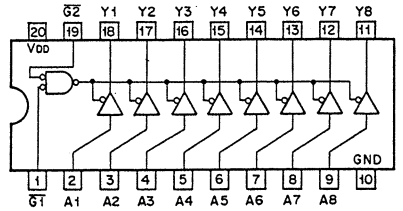
0 ; LOW LEVEL
1 ; HIGH LEVEL

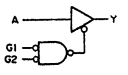
NOTE :

TYPE	VDD
74AC	+2 to 5.5V
74HC	+2 to 6V

SN74HC541ANS
SN74HCT541ANS

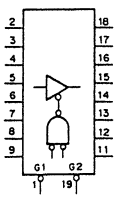
C-MOS BUFFERS AND LINE DRIVERS WITH 3-STATE OUTPUTS
– TOP VIEW –





G1	G2	A	Y
0	0	0	0
0	0	1	1
1	X	X	HI-Z
X	1	X	HI-Z

0 ; LOW LEVEL
1 ; HIGH LEVEL
X ; DON'T CARE
HI-Z ; HIGH IMPEDANCE

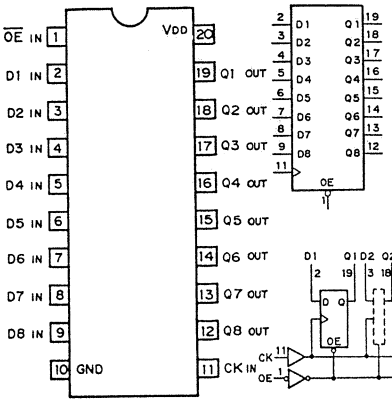


NOTE :

TYPE	VDD
AC	+2 to +5.5V
HC	+2 to +6V
ACT/HCT	+5V

SN74HC573BNS (TI) FLAT PACKAGE

C-MOS 3-STATE OUTPUTS OCTAL LATCHES
– TOP VIEW –



INPUTS			OUT
OE	CK	D	Q
0	1	1	1
0	1	0	0
0	0	X	Q_0
1	X	X	HI-Z

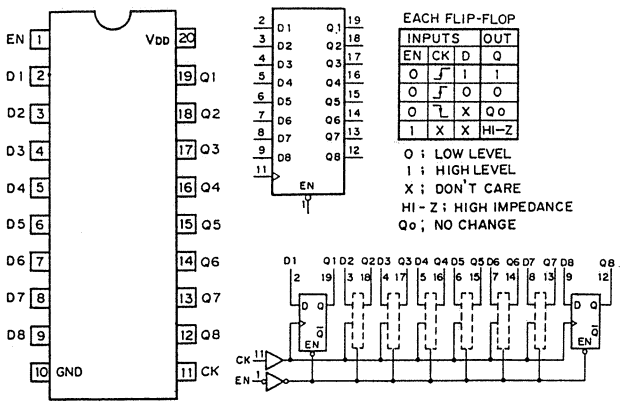
0 ; LOW LEVEL
1 ; HIGH LEVEL
X ; DON'T CARE
HI-Z ; HIGH IMPEDANCE
Q_0 ; NO CHANGE

NOTE :

TYPE	VDD
AC	+2 to +6V
HC	
ACT	+5V
HCT	
TC74AC573	+2 to +5.5V

SN74HC574ANS (TI) FLAT PACKAGE

C-MOS 3-STATE D-TYPE EDGE-TRIGGERED FLIP-FLOP
– TOP VIEW –



EACH FLIP-FLOP

INPUTS			OUT
EN	CK	D	Q
0	↑	1	1
0	↑	0	0
0	↓	X	Q_0
1	X	X	HI-Z

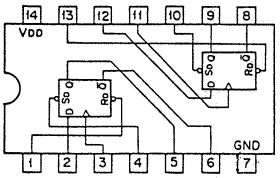
0 ; LOW LEVEL
1 ; HIGH LEVEL
X ; DON'T CARE
HI-Z ; HIGH IMPEDANCE
Q_0 ; NO CHANGE

NOTE :

TYPE	VDD
74AC/74HC	+ 2 to + 6V
74ACT/74HCT	+ 5V
TC74AC574F	+ 2 to + 5.5V

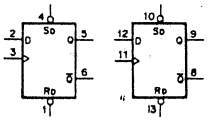
SN74HC74ANS (TI) FLAT PACKAGE

C-MOS DUAL D-TYPE FLIP-FLOPS WITH DIRECT SET/RESET
– TOP VIEW –



INPUTS				OUTPUTS	
$\overline{S_D}$	$\overline{R_D}$	CK	D	Qn+1	$\overline{Q_{n+1}}$
0	1	X	X	1	0
1	0	X	X	0	1
0	0	X	X	1	1
1	1	↑	1	1	0
1	1	↑	0	0	1
1	1	0	X	Qn	$\overline{Q_n}$

0; LOW LEVEL
1; HIGH LEVEL
X; DON'T CARE

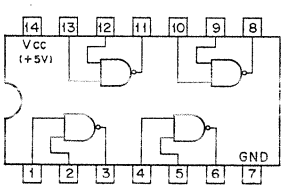


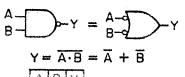
NOTE :

TYPE	VDD
TC74HCT74AF	+5V
TC74AC74 TYPE	+2 to +5.5V
74ACT74 TYPE	+4.5 to +5.5V
OTHER TYPES	+2 to +6V

SN74S00NS (TI) FLAT PACKAGE

TTL 2-INPUT POSITIVE-NAND GATE
– TOP VIEW –



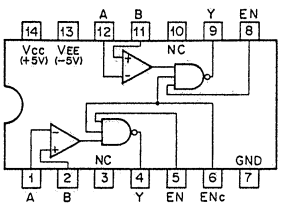


A	B	Y
0	0	1
0	1	1
1	0	1
1	1	0

0; LOW LEVEL
1; HIGH LEVEL

SN75207BN (TI)

BIPOLAR LINE RECEIVER (TTL COMPATIBLE)
– TOP VIEW –

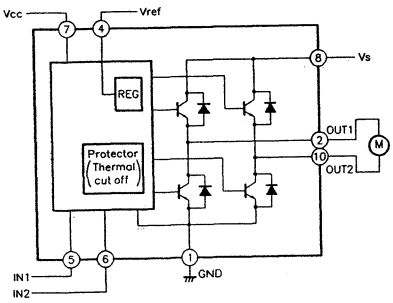


INPUTS			OUT
B − A	EN	ENc	Y
B − A ≧ 10mV	X	0	1
	0	X	1
	1	1	0
|B − A| < 10mV	X	0	1
	0	X	1
	1	1	*
B − A ≦ −10mV	X	X	1

0 ; LOW LEVEL
1 ; HIGH LEVEL
X ; DON'T CARE
* ; INDETERMINATE

TA7291P

DC MOTOR FULL-BRIDGE DRIVER
– TOP VIEW –

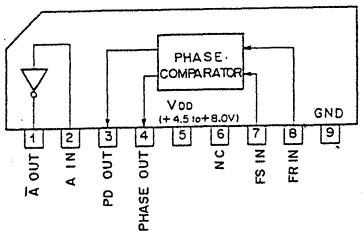


INPUT		OUTPUT		MODE
IN1	IN2	OUT1	OUT2	
0	0	∞	∞	STOP
1	0	H	L	CW/CCW
0	1	L	H	CCW/CW
1	1	L	L	BRAKE

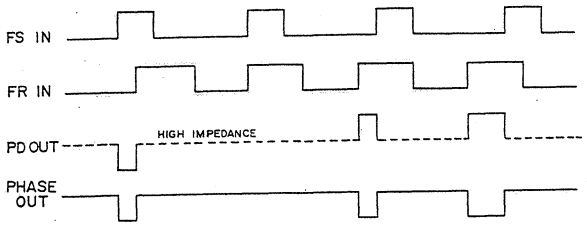
∞ : Hi Impedance

TC5081AP (TOSHIBA)

C-MOS PHASE COMPARATOR
— SIDE VIEW —

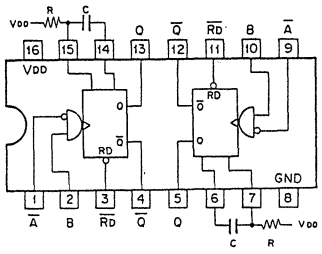


PHASE COMPARATOR TIMING CHART



TC74HC123F (TOSHIBA) FLAT PACKAGE

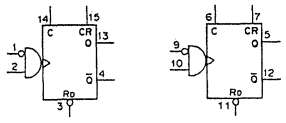
C-MOS DUAL RETRIGGERABLE MONOSTABLE MULTIVIBRATORS
– TOP VIEW –



INPUT			OUTPUT	
RD	A	B	Q	Q̄
0	X	X	0	1
1	1	X	0	1
1	X	0	0	1
1	0	⌐	⌐	⌐
1	⌐	1	⌐	⌐
⌐	0	1	⌐	⌐

0 ; LOW LEVEL
1 ; HIGH LEVEL
X ; DON'T CARE

OUTPUT PULSE WIDTH = 0.46CR

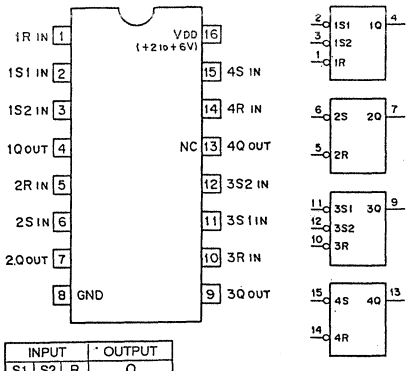


NOTE :

TYPE	VDD
TC74HCT123AF	+5V
OTHER TYPES	+2 to +6V

TC74HC279AF (TOSHIBA) FLAT PACKAGE

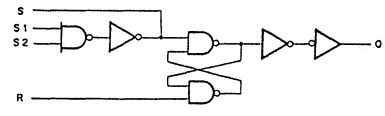
C-MOS S-R LATCH
– TOP VIEW –



INPUT			OUTPUT
S1	S2	R	Q
1	1	1	NO CHANGE
0	1	1	1
1	0	1	1
0	0	1	1
1	1	0	0
0	1	0	1
1	0	0	1
0	0	0	1

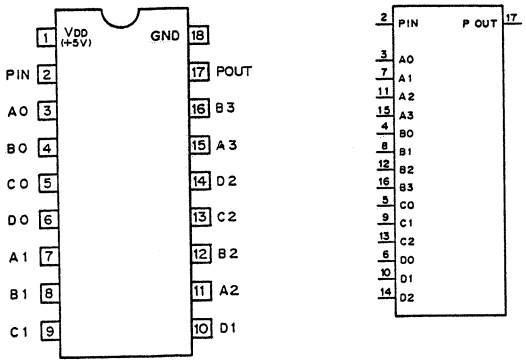
0 ; LOW LEVEL
1 ; HIGH LEVEL

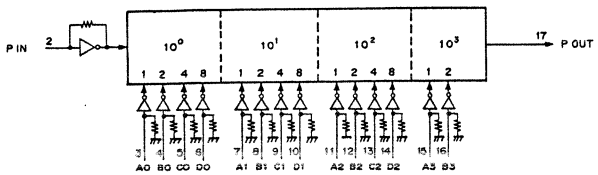
INPUT		OUTPUT
S	R	Q
1	1	NO CHANGE
0	1	1
1	0	0
0	0	1



TC9122P (TOSHIBA)

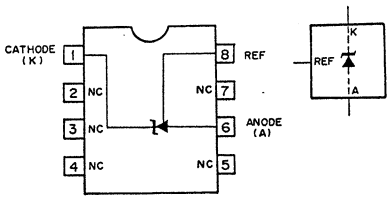
C MOS HIGH SPEED BCD PROGRAMMABLE COUNTER
— TOP VIEW —





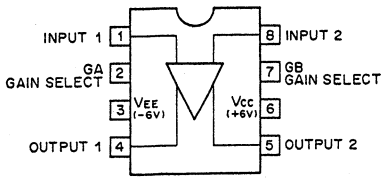
TL431CPS (TI) FLAT PACKAGE

ADJUSTABLE PRECISION SHUNT REGULATOR
— TOP VIEW —



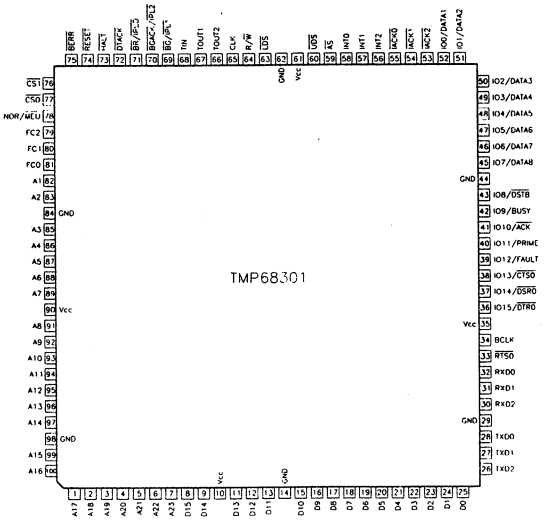
TL592PS (TI) FLAT PACKAGE

DIFFERENTIAL VIDEO AMPLIFIER
— TOP VIEW —

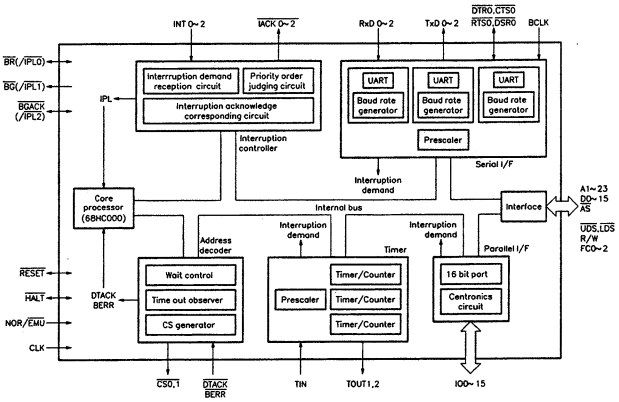


TMP68301F

16 BIT MICRO PROCESSOR
— TOP VIEW —

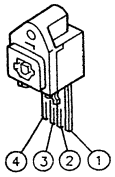


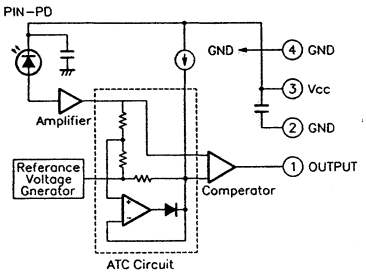
Symbol	Description	I/O
A1 ~ A23	Address bus	I/O
D0 ~ D15	Data bus	I/O
$\overline{AS}$	Address strobe	I/O, Low active
R/$\overline{W}$	Read/Write	I/O
$\overline{BR}$ (/PL0)	Bus request	I/ [O], Low active
$\overline{BG}$ (/PL1)	Bus grant	O, Low active
$\overline{BGACK}$ (/PL2)	Bus grant acknowledge	I/O, Low active
$\overline{BERR}$	Bus error	I/O, Low active
IO0 ~ IO7/ DATA1 ~ DATA8	IO port	I/O
IO8/$\overline{DSTB}$	IO port	I/O
IO9/BUSY	IO port	I/O
IO10/$\overline{ACK}$	IO port	I/O
IO11/PRIME	IO port	I/O
IO12/FAULT	IO port	I/O
IO13/$\overline{CTS0}$	IO port	I/O
IO14/$\overline{DSR0}$	IO port	I/O
IO15/$\overline{DTR0}$	IO port	I/O
TOUT1, TOUT2	Timer output	O
TIN	Timer input	I, Low active
$\overline{RTS0}$	Tranferring demand	O
RxD0, RxD1, RxD2	Receiving data	I
TxD0, TxD1, TxD2	Transferring data	O



TORX176

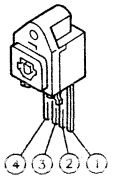
OPTICAL TRANSMITTING MODULE
– TOP VIEW –

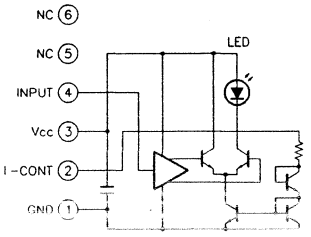




TOTX176

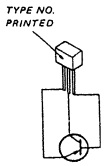
OPTICAL RECIVING MODULE
– TOP VIEW –



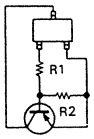


Tr

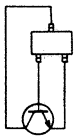
2SA1175-HFE



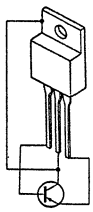
2SA1344 (R1 = 10k, R2 = 10k)



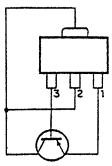
2SA1461-Y23



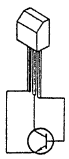
2SB553-Y



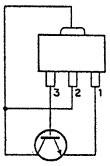
2SB798-DL



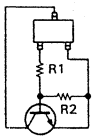
2SD774-34



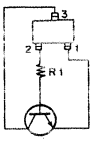
2SD999-CLCK



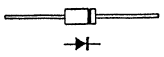
FA1A4M-L33 (R1 = 10k, R2 = 10k)



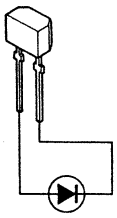
FA1L3Z-L37 (R1 = 4.7k)



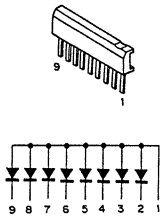
10E-2



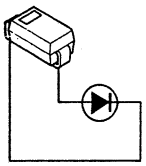
1SV101



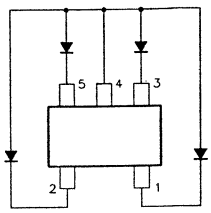
DAP803



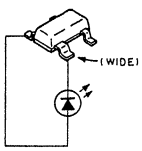
EC10QS-04



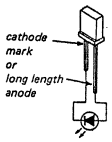
FMP1



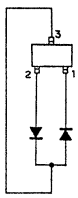
GL1PR51 ; RED



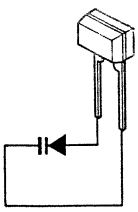
GL8HY21
GL8KG21
SLB-25YY



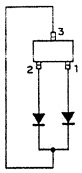
HSM88AS



KV1230Z



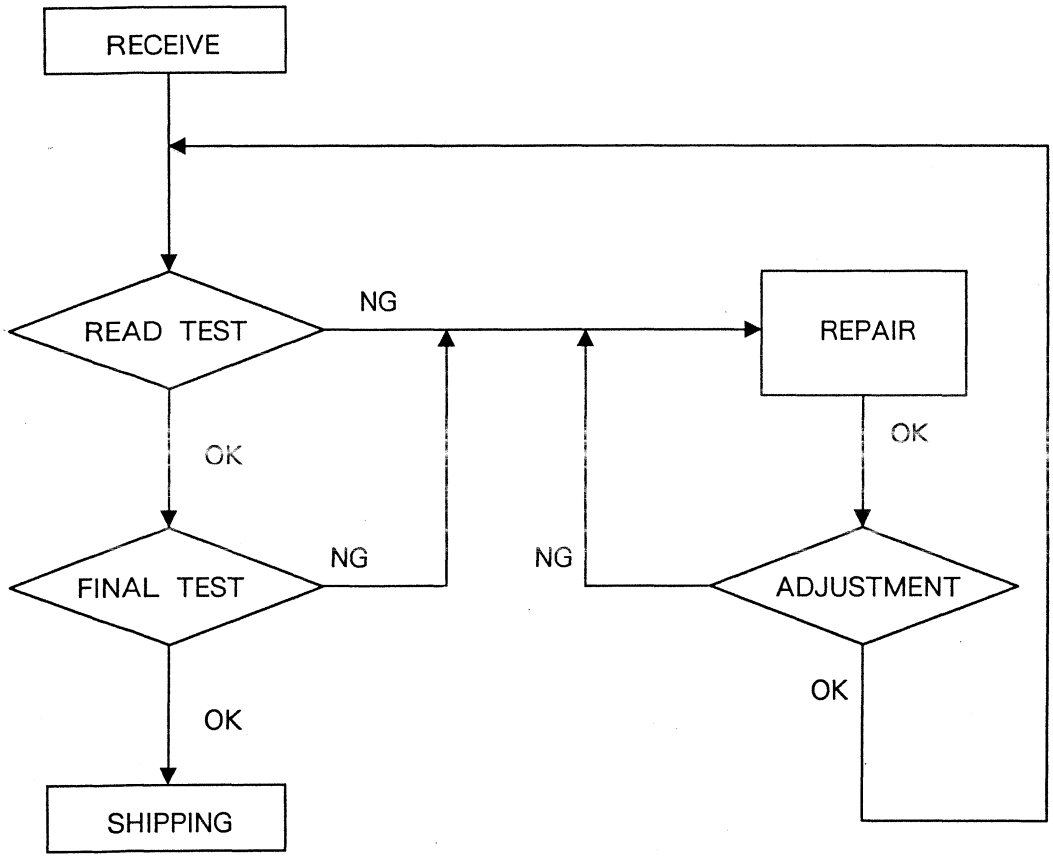
MA152WK



RD2.7M-B2
RD9.1M-B1

SECTION 6
TROUBLESHOOTING

REPAIR FLOW



• Refer to following page to know the detail information.

READ TEST ——————— Page 8-1.
FINAL TEST ——————— Page 8-4.
ADJUSTMENT ——————— Page 7-1.
REPAIR (TROUBLESHOOTING) —— Page 6-1.

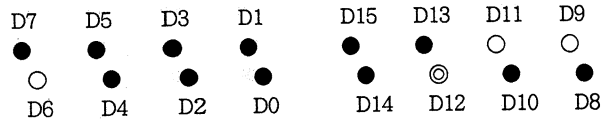
6-1. ENCODE BLOCK

6-1-1. Outline

The encode board has sixteen LEDs to monitor various conditions. Checking these LEDs helps diagnose some simple errors.

6-1-2. Definitions of LEDs

D15 to D0 show the condition of the data bus. They indicate error numbers in hexadecimal.

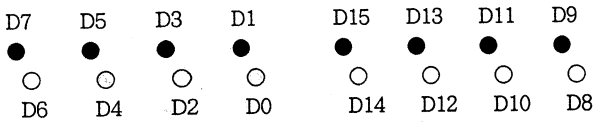


The marks are as follows ; ○ : lights
● : goes off
◎ : dimly lights
× : undefined

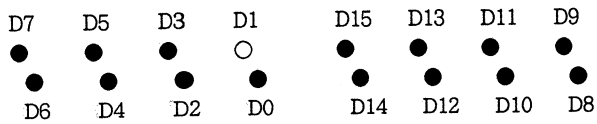
6-1-3. Correct Operating Conditions

- When the unit is operating normally, the LEDs light in the following order.

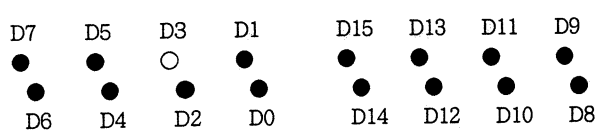
1. When the CPU starts up only 5 5 5 5 H is visible for about 3.4 seconds.



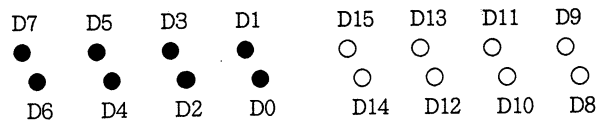
2. After the initialization check, when the job starts normally, D1 lights for about 8.3 seconds. It indicates that the initializing command is issued to the writers (Max 32).



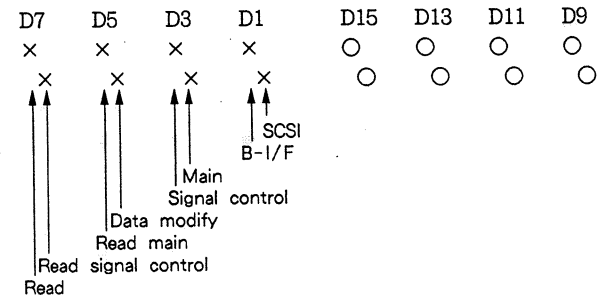
3. Then D3 lights for a moment.



4. When these processes are complete and the CPU starts waiting, the LEDs light as follows :

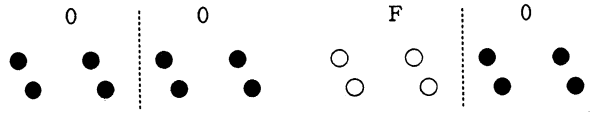


D15 to D8 light, and D7 to D0 indicate the operating jobs.



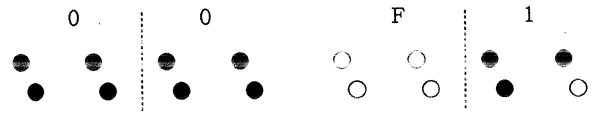
6-1-4. Errors at Starting Up

F 0 0 0 H : Data Bus Error(ROM Read Error)



This error does not occur normally. If this error occurs, check the data bus, soldered bridges of the address bus and no soldering.

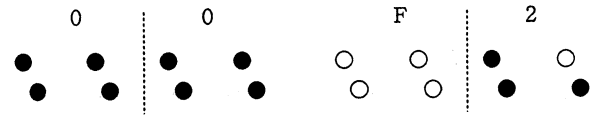
F 1 0 0 H : DMA Register Read/Write Error



Check that the low active signal is output to pin 19 of IC1104 (DMA CS) at resetting.(If it is not, IC1104 is faulty.)

If DMA CS is output correctly, IC1102 (DMA) is faulty.

F 2 0 0 H : SCSI Register Read/Write Error

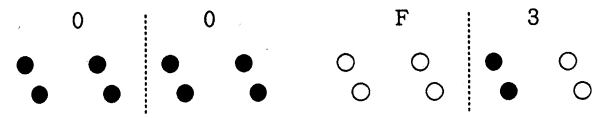


Check that the low active signal is input to pin 13 of IC1104 (SCSI WR) and pin 12 of IC1402 (SCSI RD) at resetting. (If it is not, IC1402 is faulty.)

If the SCSI RD and WR signals are output correctly, check the soldered bridges of the SCSI LSI (IC1401) terminal.

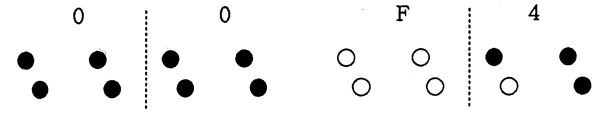
If this error still occurs, replace IC1401.

F 3 0 0 H : PLL Unlock Error



Check the voltage of test point 44 kPD$\overline{O}$ (1.8 V to 2.3 V). Also check the circuits around IC1812.

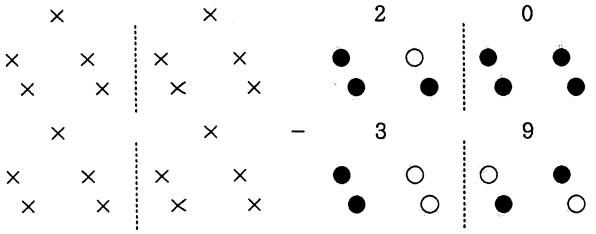
F 4 0 0 H : DMAC Error on RMA to RAM



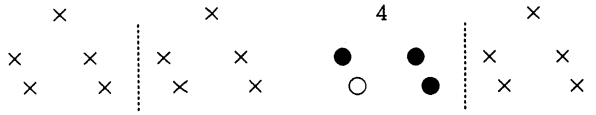
Replace the DMA (IC1102).

2000-3900H : OS Error

This added 2000H to the upper two bytes of the system call error code.

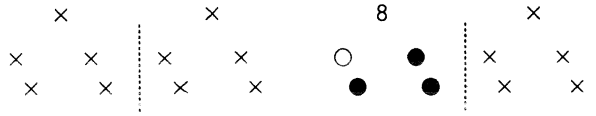


4 XXXH : SCSI Panic Error



The SCSI interface line is not connected correctly.

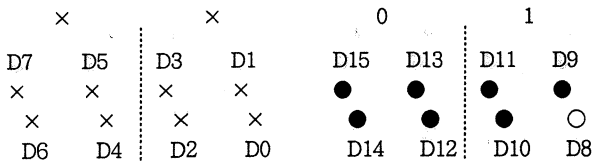
8 XXXH : B I/F Panic Error



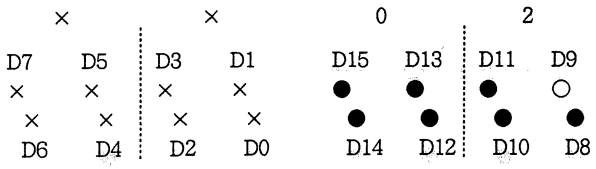
The WRITER control interface is not connected correctly. Check the soldered bridges of ICs1505, 1506, 1507, 1508, 1509, 1118 and 1117.

6-1-5. Errors in Normal Operation

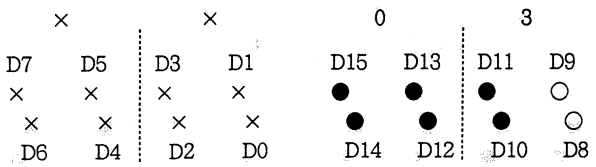
01 XX H : Memory Error



02 XX H : BUS Error

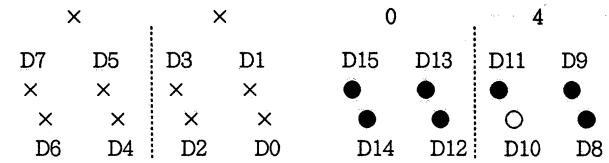


03 XX H : Address Error



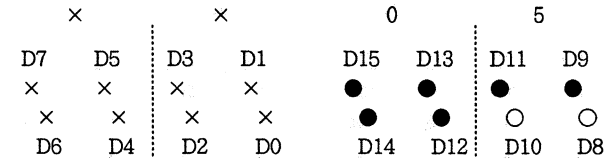
04 XX H : Illegal Instruction

(Normally, this error does not occur.)



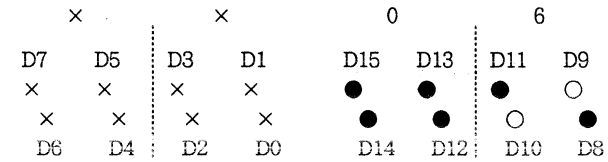
05 XX H : Zero Divide

(Normally, this error does not occur.)



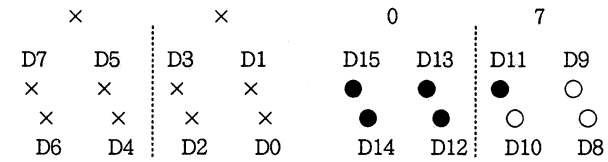
06 XX H : CHK Instruction

(Normally, this error does not occur.)



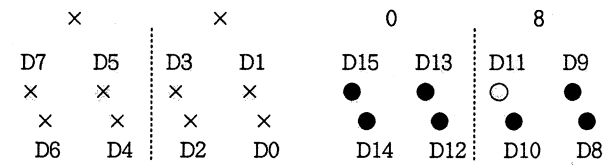
07 XX H : TRAPV Instruction

(Normally, this error does not occur.)



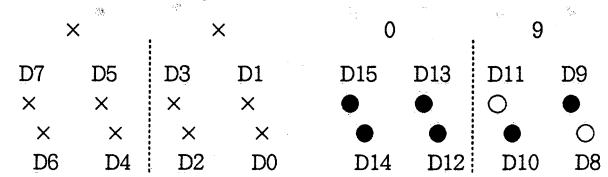
08 XX H : Privilege Violation

(Normally, this error does not occur.)



09 XX H : Trace Interrupt Instruction

(Normally, this error does not occur.)



6-2. WRITER BLOCK

Conduct the repair by referring to the following Troubleshooting Table for the errors that occur during Check of the Command Operation or Final Test.

6-2-1. Error Code table

Error Code	Meaning	Explanation of detail
00h	No Error	The command has been executed successfully.
01h	Illegal Command	The Writer doesn't know issued command.
06h	Focus Error	The Writer failed to pull the focus servo in or keep the servo on.
07h	Spindle Error	The Writer failed to pull the spindle servo in or keep the spindle servo on.
08h	Sled Error	The Writer cannot move the sled to the home position.
09h	Seek Error	The Writer cannot find the position.
0Dh	Read/Write Abort Error	The Open/Close switch was pushed during reading, writing or execution of a command other than an Open or Close Command.
10h	Illegal Parameter	At least one parameter of the B-I/F command has a bad format or an invalid value.
11h	Open/Close Error	The Writer cannot open or close the tray. An Open (Close) command was issued when the tray was already open (closed).
13h	Tracking AGC Error	The tracking AGC circuit has a fault.
14h	EEPROM Read/Write Error	The Writer cannot read (write) the data from (to) EEPROM.
16h	Command Abort	The Open/Close switch was pushed during execution of an Open or Close command.
17h	ATIP Continuity Error	During writing, the pickup jumped over the track due to a mechanical of shock.
19h	Write Power Calibration Failure	The Writer cannot calibrate the optimal write power.
1Bh	Damaged Disc	The inserted disc is damaged.
1Ch	Not Enough Recordable Area	The data to be written is too long for the recordable area.
1Dh	No EFM	The EFM isn't input to the Writer.
1Eh	EFM PLL Unlock Error	The EFM PLL circuit has a fault.
1Fh	No PCA	The inserted CD-R doesn't have enough area to calibrate the optimal write power.
20h	OS Error	An OS Error has occurred. One of the circuits around the CPU may have a fault.
21h	Illegal Max Write Power	The maximum write power in EEPROM is 00H or FFh.

6-2-2. Error Diagnoses by B-I/F Commander

ERROR CODE	Possible causes	Remedy
01H (Illegal Command)	Misoperation (An attempt was made to execute a non-existent command.)	
06H (Focus Error)	1. The disc has is damaged, or has been overwritten. 2. The focus or tracking servo is not adjusted correctly. 3. The BU connector is not connected.(CNJ101) 4. The Focus Error signal (S-waveform) does not appear correctly. 5. The FOK signal of IC310 (CXA1372) is not output.	Change the disc. Readjust it.(RV302, RV301) Connect the connector. Change the OP. (KRM-131A (RP)) Check the RF signal, and change the IC310.
07H (Spindle Error)	1. The disc type (CD or CD-R) is wrong. 2. EFM (double speed or normal speed) is wrong. 3. The ATIP error rate is wrong. 4. The spindle servo is not adjusted correctly. 5. The focus or tracking is not adjusted correctly. 6. The focus or tracking signal is not output correctly. 7. The BU connector is not connected.	Use the correct disc. Switch the speed. Change the OP. (KRM-131A (RP)) Readjust it.(RV401) Readjust it.(RV302, RV301) Change the OP.(KRM-131A (RP)) Connect the connector
08H (Sled Error)	The most inner sled detection SW (CN101 (31)) is faulty.	Change the limit SW ass'y
09H (Seek Error)	1. Track jump is impossible due to damage to the disc. 2. There is an offset in the tracking error signal. 3. ATIP or SUBCODE cannot be read. 4. The servo block is not adjusted correctly.	Change the disc. Change the OP.(KRM-131A (RP)) Readjust it.(RV302, RV301, RV401)
0DH (Read/Write Abort Error)	Misoperation	
10H (Illegal Parameter)	A command parameter is wrong.	Input the correct parameter.
11H (Open/Close Error)	1. The mechanical deck is faulty. 2. The connector is not connected. 3. The motor driver IC (IC725) is faulty.	Change the MD. Connect the connector Change the IC725.
13H (Tracking AGC Error)	1. The tracking AGC circuit is faulty. 2. The tracking signal is not output.	Check the circuit. Change the OP.(KRM-131A (RP))
14H (EEPROM R/W Error)	The EEPROM is faulty.(IC706)	Change the IC706.
15H (Inappropriate Command)	Misoperation	Input a correct command.
16H (Command Abort)	The Open/Close SW was pressed while a command was being processed.	
17H (ATIP Continuity Error)	A track was skipped while writing data. → Damage → Tracking servo is faulty. → Sled is faulty.	Change the disc Readjust it.(RV301) Change the gear box ass'y (2).

ERROR CODE	Possible causes	Remedy
19H (Writ Power CAL Fail)	The most appropriate power could not be found. → The asymmetry detection circuit is faulty. → LD deterioration → The max power is not set correctly.	 Check the circuit. Change the OP.(KRM-131A (RP)) Reset it.
1BH (Damaged Disc)	1. The disc has been overwritten. 2. TOC or ATIP INFO cannot be read while identifying the disc.	Change the disc. Change the disc.
1CH (Not enough Record Area)	Misoperation for the write start command	
1DH (No EFM)	EFM has not been input.	Switch DIP-SW ENC on.
1EH (EFMPLL unlock)	EFMPLL is not locked.	Readjust it.(RV502)
1FH (No PCA)	There is no PCA (writing test area).	Change the disc.
20H (OS Error)	A circuit around the writer CPU is faulty.	Check the soldering, or change the part.
21H (Illegal Max Write Power)	The max power value of IC706 is not correct.	Change the IC706.

6-2-3. Saving and storing the hours meter value

When replacing only the writer board, transfer the hours meter value from the old board into the new board as follows. As a matter of course, when the ROM is faulty, these procedures are not operable.

Preparation

Test disk : Not used
Tools and equipment : Refer to page 7-1 ADJUSTMENT (Section 7)
Connection : Refer to pages 7-1 and 7-2 ADJUSTMENT (Section 7)

Operation

①. Connect the required equipment.

②. Turn on the power to the computer and the unit.

③. Start up the B I/F commander. (Fig. 1)

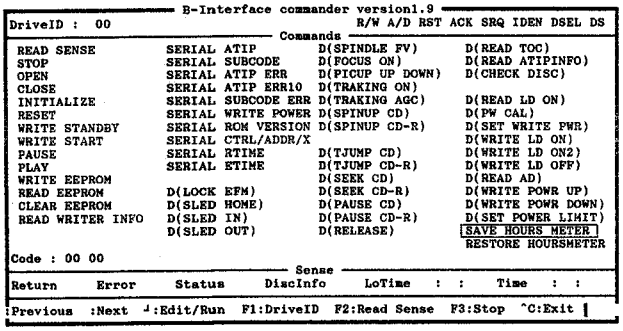


Fig. 1

④. Select the SAVE HOURS METER command, and press the enter key.
The following display appears (Fig. 2) :

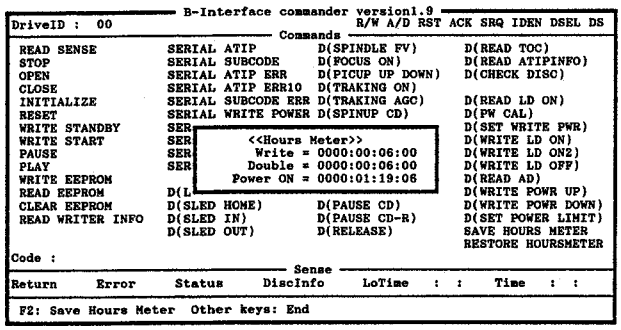


Fig. 2

⑤. Press F2. (Fig. 3)

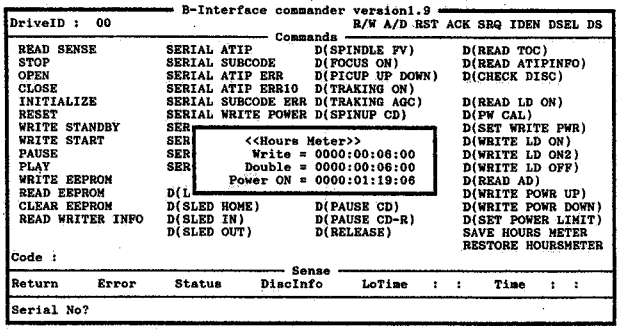


Fig. 3

⑥. Input the serial number of the unit. (Fig. 4)

Example : 10049

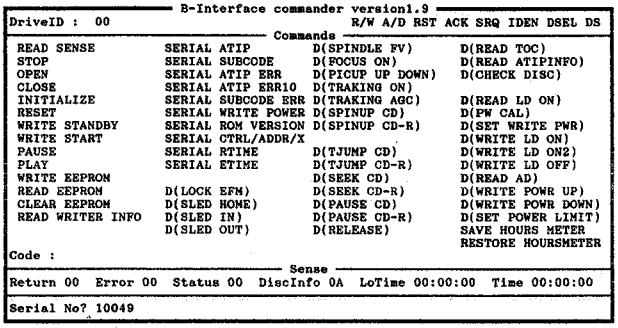

B-Interface commander version1.9
DriveID : 00
R/W A/D RST ACK SRQ IDEN DSEL DS
Commands
Code :
Sense
Return 00 Error 00 Status 00 DiscInfo 0A LoTime 00:00:00 Time 00:00:00
Serial No? 10049

Fig. 4

⑦. Press the Enter key. The value is saved in the SERIALNO.DAT file. (Fig. 5)

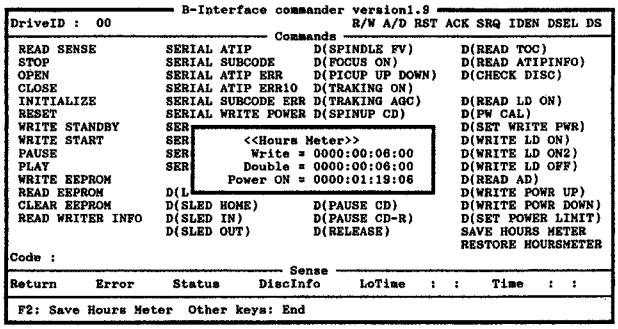


Fig. 5

⑧. Press the Enter key to return to the menu.

⑨. Turn off the unit.

⑩. Replace the faulty writer board into new board.

⑪. Turn on the unit.

⑫. Select the RESTORE HOURSMETER command, and press the Enter key. (Fig. 6)

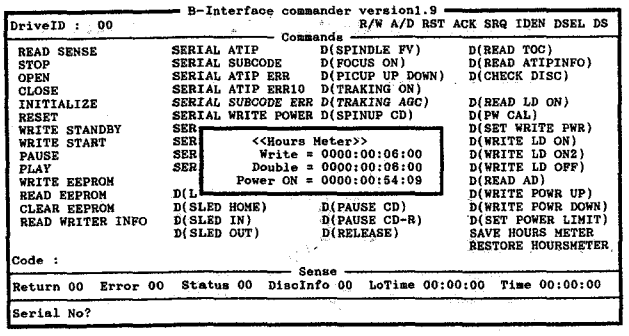


Fig. 6

Ⓐ. Input the serial number of the unit. Press the Enter key. (Fig. 7)

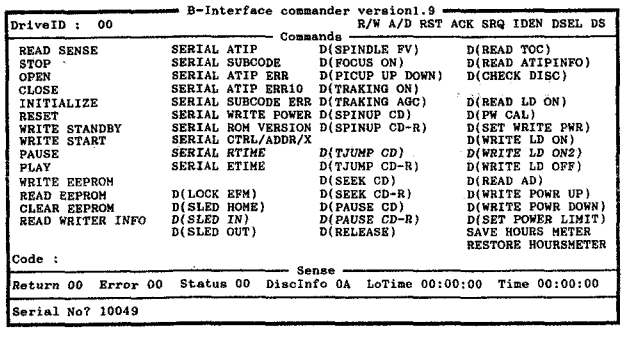


Fig. 7

Ⓑ. Press F3. (Fig. 8)
The hours meter value of the writer board is displayed.

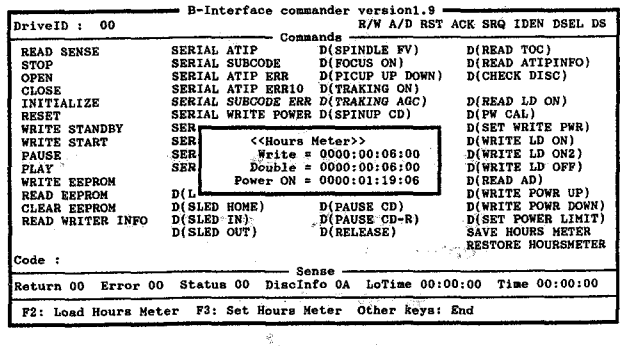


Fig. 8

Ⓒ. Press the Enter key.
This operation completes transfer of the value on the old board into the new board.

Ⓓ. Press the Enter key to return to the menu.

SECTION 7
ADJUSTMENT

Perform the following adjustments when changing the mount board (writer or encode) and optical device.

7-1. TOOLS AND MEASURING EQUIPMENT

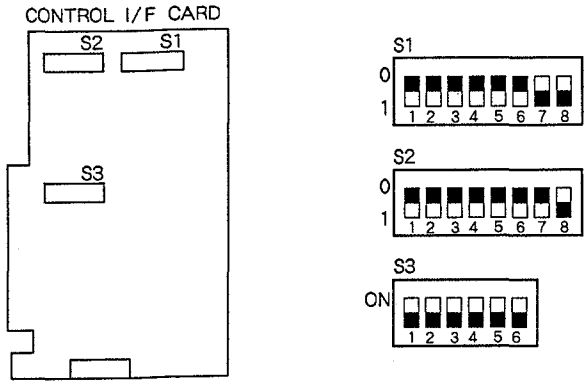
- Computer : IBM-PC/AT or
  Quarter-L (PCX-300 series)
- CRT display
- Disc used : CDW-M63 or CDW-M74
- CDW control I/F card : J-9060-640-A
- ATIP indicator board : J-9095-030-A
- Software (3.5" floppy)
  CDW test/Ver. 1.4 : J-9095-010-A
- Test unit : CDW-900E
- MAX power adjustment tool : J-9095-070-A
- Cables
  ATIP display cable : J-9095-050-A
  BIF cable : RK-B005
- Measuring equipment
  Optical power meter : TQ8210 (ADVANTEST)
  Oscilloscope (30 MHz)
  CDW attachment tool : J-9095-020-A

7-2. PREPARATION

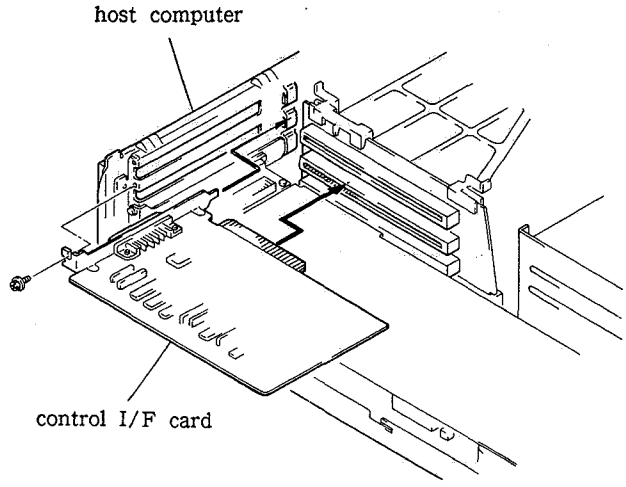
7-2-1. Attaching CDW Control I/F Card

7-2-1-1. Set the DIP Switches

< Setting and location of DIP Switches >



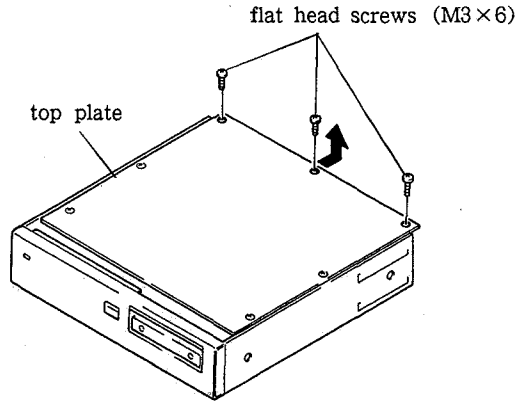
7-2-1-2. Attach the control I/F card to the free slot.



7-2-2. Connections

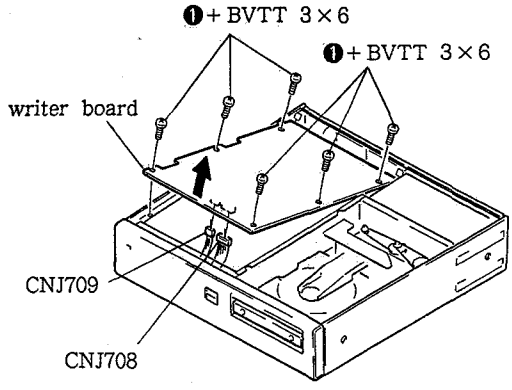
7-2-2-1. Remove the top plate of CDW-900E.

Remove the three screws as shown in the figure :

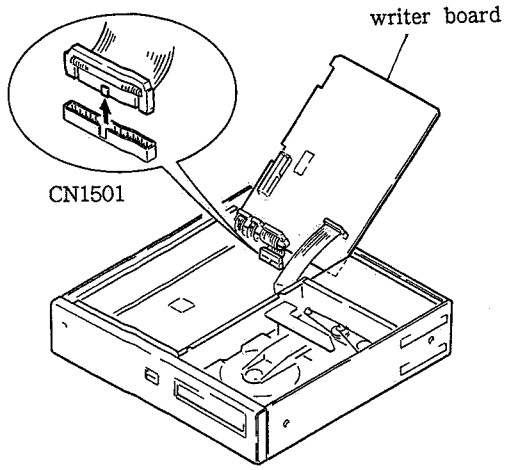


7-2-2-2. Remove the six screws of the writer board.

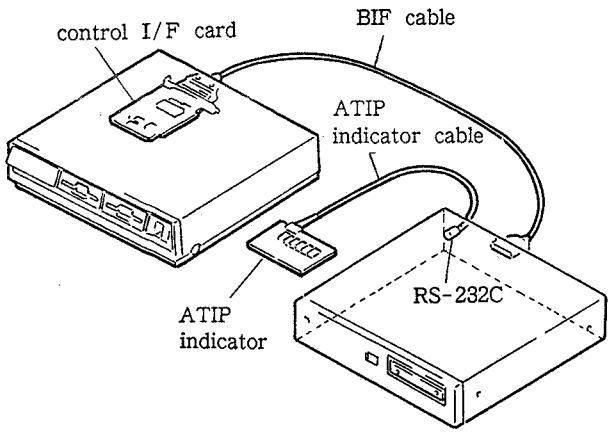
7-2-2-3. Remove the CNJ709 and CNJ708 connectors.



7-2-2-4. Remove the connector connected to CN1501.



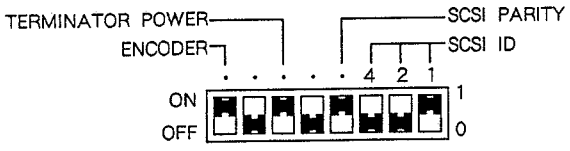
7-2-2-5. System diagram



7-2-3. Setting CDW-900E DIP Switches

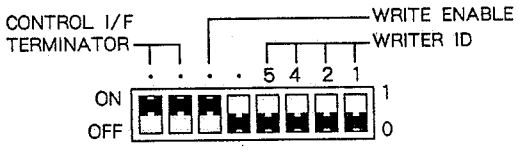
Set the DIP switches at the rear of the CDW-900E as shown in the following figure :

The encode DIP switches set the SCSI ID and the internal encode functions.
The figure below shows the default settings.
Always turn off the power to the unit before changing DIP switch settings.



Encode Settings

The writer DIP switches set the writer ID address and the functions of the writer block.
The figure below shows the default settings.
Always turn off the power to the unit before changing DIP Switch settings.



Writer Settings

7-2-4. Starting Up the B-I/F Commander

7-2-4-1. Insert the CDW test/Ver. 1.4 to drive A, and turn the computer power on.

The starting display appears as follows :

```
                    Jig For CDW-900E Ver1.4E
B-I/F commander
CDW-900E Final Test
CD-ROM data check

List hours meters files
Delete hours meters files
```

7-2-4-2. Move the cursor on the B-I/F commander, and press the enter key.

The B-I/F commander display appears as follows :

```
                B-Interface commander version1.9
DriveID : 00                          R/W A/D RST ACK SRQ IDEN DSEL DS
                          Commands
READ SENSE          SERIAL ATIP        D(SPINDLE FV)      D(READ TOC)
STOP                SERIAL SUBCODE     D(FOCUS ON)        D(READ ATIPINFO)
OPEN                SERIAL ATIP ERR    D(PICUP UP DOWN)   D(CHECK DISC)
CLOSE               SERIAL ATIP ERR10  D(TRAKING ON)
INITIALIZE          SERIAL SUBCODE ERR D(TRAKING AGC)     D(READ LD ON)
RESET               SERIAL WRITE POWER D(SPINUP CD)       D(PW CAL)
WRITE STANDBY       SERIAL ROM VERSION D(SPINUP CD-R)     D(SET WRITE PWR)
WRITE START         SERIAL CTRL/ADDR/X                    D(WRITE LD ON)
PAUSE               SERIAL RTIME       D(TJUMP CD)        D(WRITE LD ON2)
PLAY                SERIAL ETIME       D(TJUMP CD-R)      D(WRITE LD OFF)
WRITE EEPROM                           D(SEEK CD)         D(READ AD)
READ EEPROM         D(LOCK EFM)        D(SEEK CD-R)       D(WRITE POWR UP)
CLEAR EEPROM        D(SLED HOME)       D(PAUSE CD)        D(WRITE POWR DOWN)
READ WRITER INFO    D(SLED IN)         D(PAUSE CD-R)      D(SET POWER LIMIT)
                    D(SLED OUT)        D(RELEASE)         SAVE HOURS METER
                                                          RESTORE HOURSMETER
Code : 00 00
                          Sense
Return    Error    Status    DiscInfo    LoTime  :  :    Time  :  :
:Previous  :Next  ┘:Edit/Run  F1:DriveID  F2:Read Sense  F3:Stop  ^C:Exit
```

7-2-4-3. How to use the B-I/F commander

Move the cursor to the object command with the "→", "←", "↑" and "↓" keys and press the enter key. The selected command is executed.

7-3. ADJUSTMENT

A: Writer Board

7-3-1. Adjustment items, adjustment VR and test points

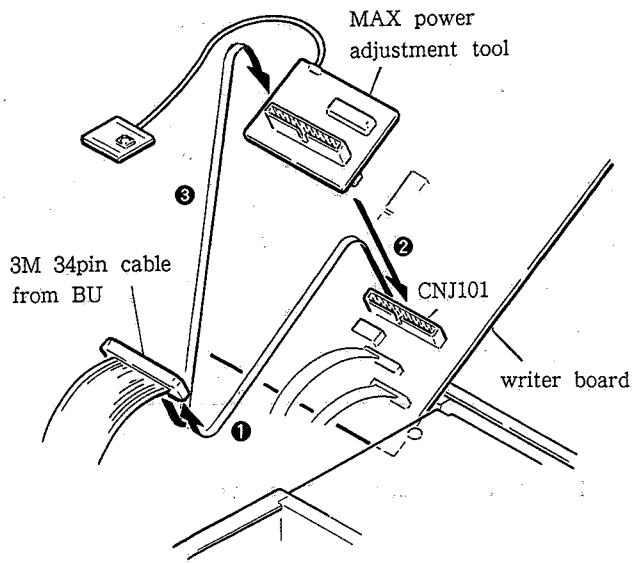
Adjustment point and test point

Adjustment item	Adjustment point		Test point	
	REF. No	Location	NAME	Location
Maximum write power setting	———	———	———	———
EFM PLL	RV502	13G	SFTCK SFTEFM	9G 9G
PBVCO (VCO in playback PLL)	RV501	13D	VCOI 4FSS/384FS	13D 12D/12E
Laser power at reading	RV101	7H	FMONI RDMONI	5H 6H
Focus servo loop gain	RV302	12J	FE3 FE2	12J 12J
Tracking servo loop gain	RV301	12J	TE3 TE2	12I 13I
Spindle bias	RV401	16D	ATPD0	15D
Focus bias at writing	RV303	14H	ARF ATFG	5J 15E
Tracking bias at writing	RV304	14H	TB	14H

7-3-2. Maximum Write Power Setting

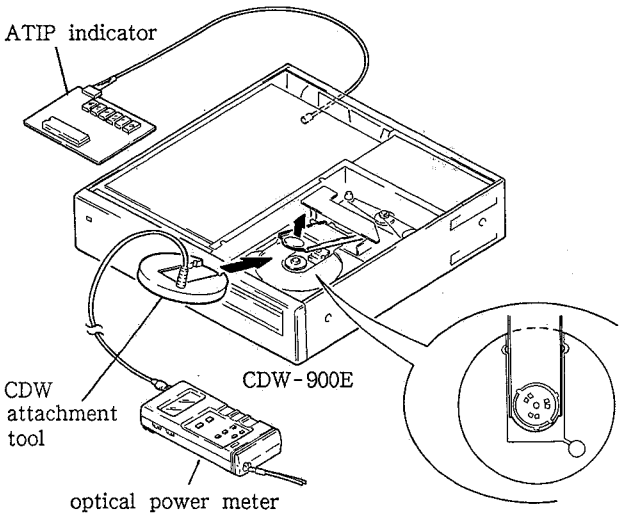
7-3-2-1. Attaching the MAX Power Adjustment Tool

1. Remove the cable (34P) from the BU unit connected to CNJ101 on the writer board, and attach the adjustment tool as shown in the figure.



2. The ATIP indicator must be connected.

3. Set the CDW attachment tool on the tray as shown in the figure.



4. Turn on the power to CDW-900E.
5. Execute the CLEAR EEPROM command.
   Code : 63 53 00 00 00 00 00 00 00 00
6. Execute the INITIALIZE command.
7. Execute the LOCK EFM command to lock the EFM signal.
8. Execute the SLED HOME command.
9. Execute the SLED OUT command.
   Code : 67 04 05 00 00 00 00 00 00 00
10. Execute the SERIAL WRITE POWER command. The ATIP-indicator is reset.
11. Execute the WRITE EEPROM command and set data as follows :
    Code : 61 00 00 00 00 6E 00 00 00 00
    00 : address on EEPROM to be written
    6E : maximum power (peak value)
    00 : maximum power (averaged value) which will be determined later.
12. Execute the SET WRITE POWER command as follows :
    Code : 67 1B C0 00 00 00 00 00 00 00
    This C0 is a provisional value. It will be increased by the next WRITE POWER UP command.
13. Execute the WRITE POWER UP command.
14. While the MAX power adjustment tool's button is hold down, each press of the ENTER key increases the laser power value.
    Keep pressing the enter key until the optical power meter reads as close to 11 mW as possible.
    If the reading goes over 11 mW, execute the WRITE POWER DOWN command to decrease the laser power.
15. Execute the SET POWER LIMIT command.
    This command writes the maximum power to the EEPROM.
16. Turn the MAX power adjustment tool switch off.

17. Execute the READ WRITER INFO command, and check whether the written data is the same as the data which ATIP indicator shows.

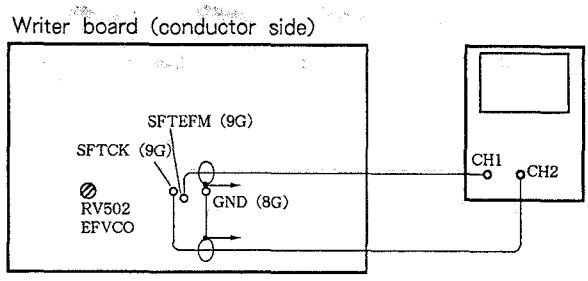
```
B-Interface commander version1.9
DriveID :  00                                  R/W A/D RST ACK SRQ IDEN DSEL DS
                              Read Info
                Vendor) Sony
               Product) CDW-900E
               Version) 1.11
       Max write power) 11.00(mW), D5(hex)
           Hours Meter)    Write = 0000:00:06:00
                          Double = 0000:00:06:00
                        Power ON = 0000:01:19:06

      Sequencer error) 28h : Spindle CD
       Mechacon error) 05h : Spindle Error

        B-I/F command) Direct Command
                       67 26 00 00 00 00 00 00 00 00
    Main task status) 00h : Initial
  Sequencer command) 26h : D Disc Check
Function in Sequencer) 08h : D Spindle CD
  Mechacon command) 08h : Spindle CD
           Subcode) 01:56:23
              ATIP) 02:00:18
    Open/Close SW) Enable
       Write mode) Enable, Power = 00(hex)
        A/D value)    Read Power = 00h,          Write Power = 77h
                   Land at Writing = 14h,    11T Pit at Writing = 45h
                 4T Pit at Writing = 0Bh,     Peak at Writing = 25h
            Peak hold of reading = 16h,Bottom hold of reading = 8Fh
        I/O ports)          76543210
                       66500/1 A 11110101
                       66500/1 B 10000101
                       66500/1 C 00110111
                       66500/1 E 10111001
                       66500/1 F 10110101
                       66500/1 G 10110111
                       66500/2 A 01011100
                       66500/2 B 11001000
                       66500/2 C 10100100
                       66500/2 E 11101101
                       66500/2 F 11111110
                       66500/2 G 11111111
          OS error) 00h
        Number of)    Hard Error =    39
                      Written Disc =     1
                              Sense
00 00 0B 80 12 00 00 00 19 33 63 01 00 00 00 00 00 00 A0 53 6F 6E 79 20 20 20 20
(00)----------(05)----------(10)----------(15)----------(20)----------(25
:Scroll Up  :Scroll Down  OtherKey:End
```

7-3-2-2. EFM PLL

Preparation

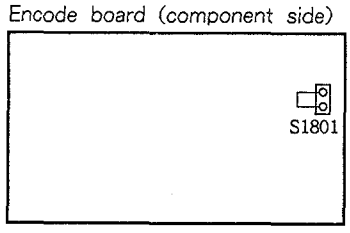
Test disk	:	Not used
Measurement equipment	:	Oscilloscope
Adjustment point	:	RV502 (13G)
Test points	:	SFTCK (9G) and SFTEFM (9G)

Adjustment point and connection



Procedure

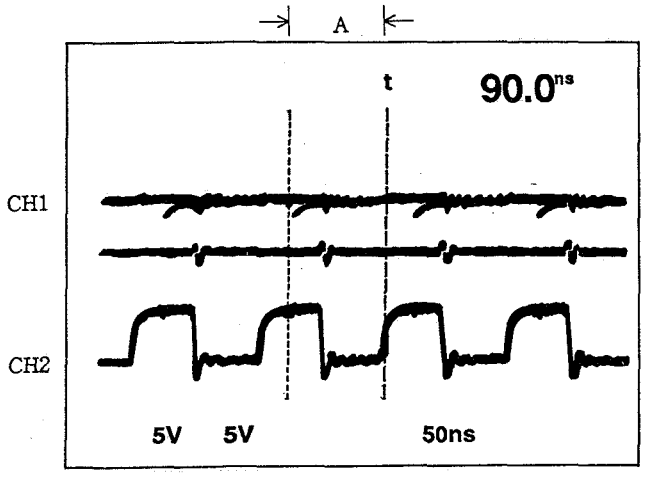
1. Connect an oscilloscope to the test points as shown in the figure above.
2. Short the terminals of S1801 (on the encode board) with a clip to put the unit in double-speed mode.



3. Turn on the power to this unit.
4. Execute the LOCK EFM command of the B I/F commander.
   Input 40 to put unit in double-speed mode.

   Code : 67 2e 40 00 00 00 00 00 00 00

5. Fix the waveform as shown in the figure.



6. Adjust RV502 so that the following specification is satisfied.

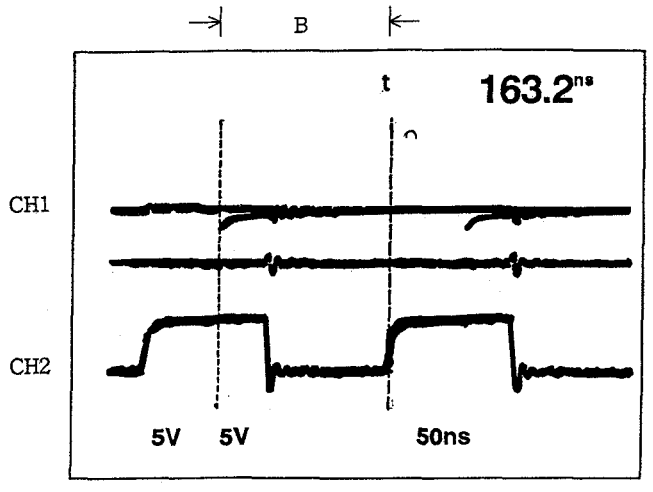
< Specification > A = 90 ns ± 2 ns

7. Remove the clip shorting S1801 to put the unit in normal mode.
8. Execute the LOCK EFM command, and input 00 to return the unit to normal speed.

Code : 67 2e 00 00 00 00 00 00 00 00 00

9. The following specification must be satisfied at normal speed.

B = 160 ns ± 5 ns



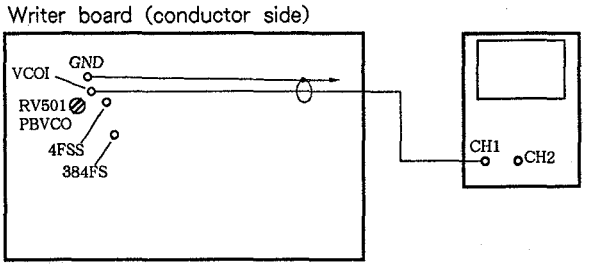
10. Execute the LOCK EFM command several times, and check that the waveform remains fixed.

7-3-2-3. PBVCO (VCO in playback PLL)

Preparation

Test disk	:	Not used
Measurement equipment	:	Oscilloscope
Adjustment point	:	RV501 (13D)
Test points	:	VCOI (13D) and 4FSS (12D) and 384FS (12E)

Test point and connection



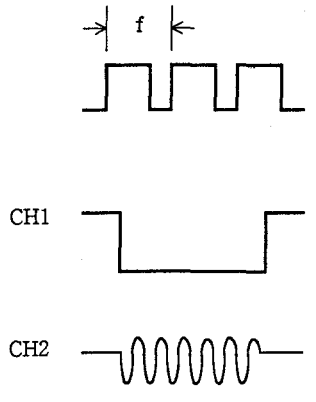
Procedure

1. Connect an oscilloscope to the test point (VCOI).
2. Turn on the power to the unit.
3. Adjust RV501 so that specification 1 is satisfied.

< Specification 1 > VCOI voltage : 2.0 V ± 0.1 V

4. Connect the oscilloscope to 4FSS (12D) and 384FS (12E). Check that the signals at these points are locked at the following frequencies :

4FSS : 176.4 kHz
384FS : 16.39 MHz

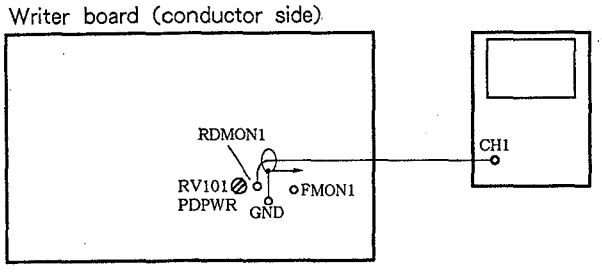


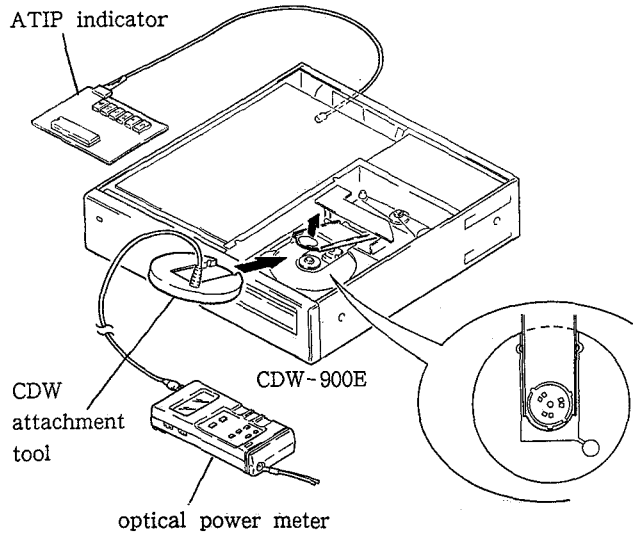
7-3-2-4. Read Power Adjustment

Preparation

Test disk : Not used
Measurement equipment : Oscilloscope
Optical power meter (TQ8210 : ADVANTEST)
CDW attachment tool (J-9095-020-A)
Adjustment point : RV101 (7H)
Test points : FMONI (5H) and RDMONI (6H)

Test point and connection





Procedure

1. Connect the oscilloscope and optical power meter to the unit.
2. Turn on the power to the unit.
3. Execute the SLED HOME command.
4. Execute the SLED OUT command.
   Code : 67 04 05 00 00 00 – – – – – – – –
5. Execute the READ LD ON command.
6. Adjust RV101 so that the DC level of FMONI (test point) satisfies specification 1.
   Check that the READ power at that time satisfies specification 2.

   < Specification 1 > DC level (FMONI) : 0.3 V ± 0.1 V
   < Specification 2 > Read Power : 1.2 mW ± 0.05 mW
7. Check that specification 3 is satisfied.

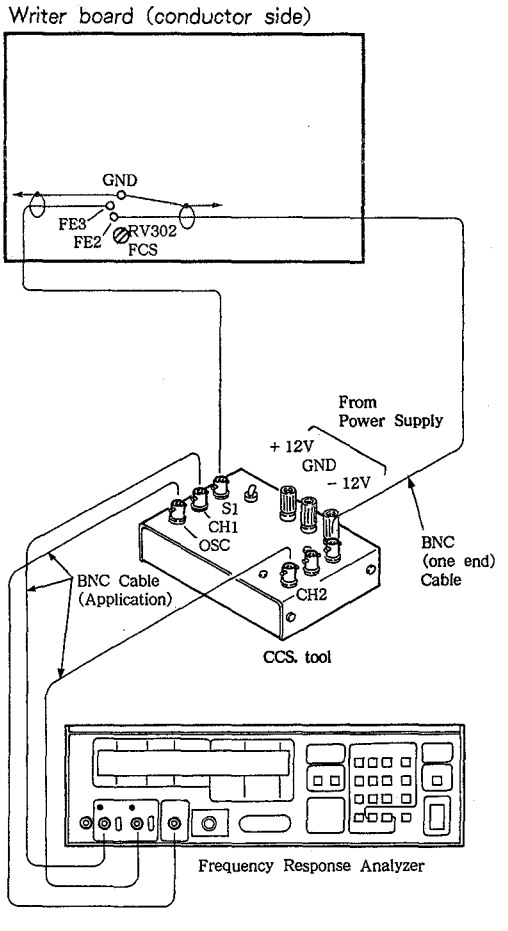
   < Specification 3 > DC level (RDMONI) : 1.8 V ± 0.2 V
8. Execute the STOP command.
9. Disconnect the oscilloscope and laser power meter.

7-3-2-5. Focus Servo Loop Gain Adjustment

Preparation

Test disk : YEDS-18 : (3-702-101-01)
Measurement equipment : Frequency response analyzer : 5010 A/NF Electronic Instruments
: Constant current source (CCS) tool : J-9075-010-A
Adjustment point : RV302 (12J)
Test points : FE3 (12J) and FE2 (12J)

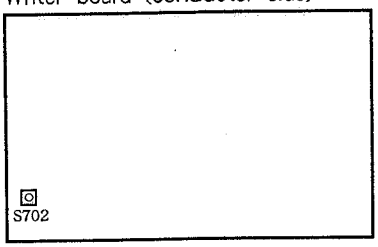
Test point and connection



Procedure

1. Connect the response analyzer and CCS tool.
2. Set the frequency response analyzer as follows :
   Disturbance frequency : 1 kHz
   Disturbance amplitude : 100 mV
   Integration time : 5 to 10 times
   Analysis mode : CH-1/CH-2
   Float : GND
3. Turn on the power to the unit.

Writer board (conductor side)



4. Insert the test disk (YEDS-18). Open the door using S702.
5. Execute the LOCK EFM command.
   Code : 67 2e 00 00 00 – – – –
6. Execute the SPINUP CD command.
7. Turn on switch S1 of the CCS tool.
8. Press the [Measure] button of the frequency response analyzer.
9. Adjust RV302 so that the gain and phase satisfy the specification.

   Gain : 0 dB ± 0.5 dB
   Phase : 40° or more

10. Execute the STOP command.

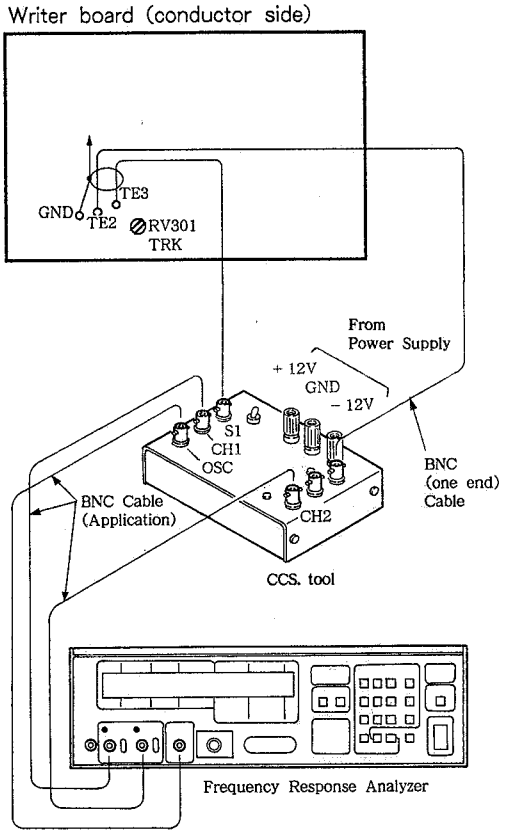
7-3-2-6. Tracking Servo Loop Gain Adjustment

Preparation

Test disk	: YEDS-18 : 3-702-101-01
Measurement equipment	: Constant current source (CCS) tool : J-9075-010-A
Frequency response analyzer	: 5010A/NF Electronic Instruments
Adjustment point	: RV301 (12J)
Test points	: TE3 (12I) and TE2 (13I)

Test point and connection

Writer board (conductor side)



Procedure

1. Connect the frequency response analyzer and the CCS tool.
2. Set the frequency response analyzer as follows :
   Disturbance frequency : 1 kHz (∗ 1.5 kHz)
   Disturbance amplitude : 100 mV
   Integration time : 5 to 10 times
   Analysis mode : CH-1/CH-2
   Float : GND
3. Turn on the power to the unit.
4. Insert the test disk (YEDS-18). Open the door using S702.
5. Execute the LOCK EFM command.

   Code : 67 2e 00 00 00 – – – – –

6. Execute the SPINUP CD command.

   Code : 67 27 00 00 00 – – – – –

7. Turn on switch S1 of the CCS tool.
8. Press the [Measure] button of the frequency response analyzer.
9. Adjust RV301 so that the gain and phase satisfy the specification.

   * < Specification 1 > For versions A to C of CDW-900E
   Gain : 0 dB ± 0.5 dB at 1.5 kHz
   Phase : 30° or more

   < Specification 2 > For version D onwards
   Gain : 0 dB ± 0.5 dB at 1.0 kHz
   Phase : 35° or more

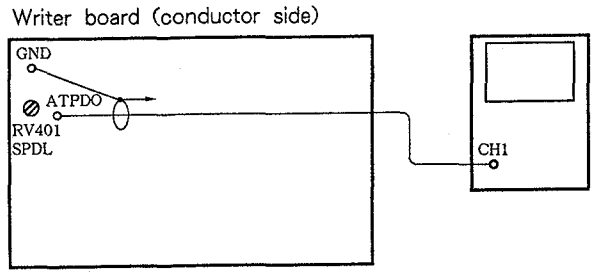
10. Execute the STOP command.

7-3-2-7. Spindle Bias Adjustment

Preparation

Test disk	: CD-R
Measurement equipment	: Oscilloscope
Adjustment point	: RV401 (16D)
Test point	: ATPDO (15D)

Test point and connection



Procedure

1. Connect the oscilloscope to the test points.
2. Short the terminals of S1801 (on the writer board) with a clip to put the unit in double-speed mode.
3. Turn on the power to the unit.
4. Insert a new disk (CD-R).
5. Execute the LOCK EFM command of the B I/F commander.
   Input 40 to put the unit in double-speed mode.

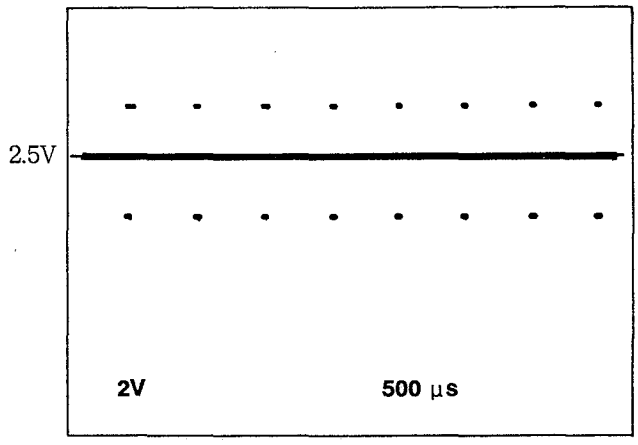
   Code : 67 2e 40 00 00 00 – – – – –

6. Execute the SPINUP CD-R command.

   Code : 67 28 40 00 – – – – –

7. Adjust RV401 so that the DC level is within the specification.

   < Specification > DC level : 2.5 V (The upper side and lower side are symmetrical.)



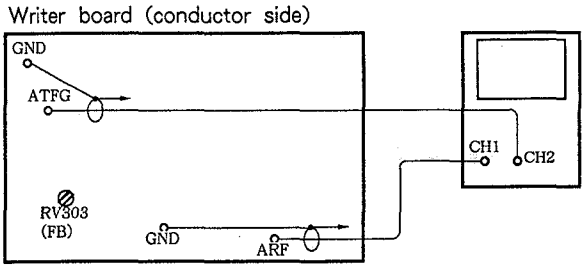
8. Execute the STOP command.
9. Turn off the power to the unit.
10. Remove the jumper cable.

7-3-2-8. Focus Bias Adjustment (at recording)

Preparation

Test disk	: Blank CD-R or CD-R which can record
Measurement equipment	: Oscilloscope
Adjustment point	: RV303 (14H)
Test points	: ARF (5J) and ATFG (15G)

Test point and connection



Procedure

1. Connect the oscilloscope to the test points.
2. Turn on the power to the unit.
3. Insert the blank CD-R.
4. Execute the LOCK EFM command.
   (67 2e 00 00 00 – – – –
5. Execute the SLED HOME command.
6. Execute the SLED OUT command three times.

7. Execute the SPINUP CD-R command, and input 01.

   Code : 67 28 01 00 00 00 – – – –

8. Execute the PW CAL command, and input the following numbers to "MM, SS, FF".

   Code : 67 24 00 40 00 00 00 00 00 00

   Input : MM = 40, SS = 00, FF = 00

9. Execute the READ SENSE command to read the appropriate WRITE POWER.
   Press F1, and set the following mode.

   most appropriate power

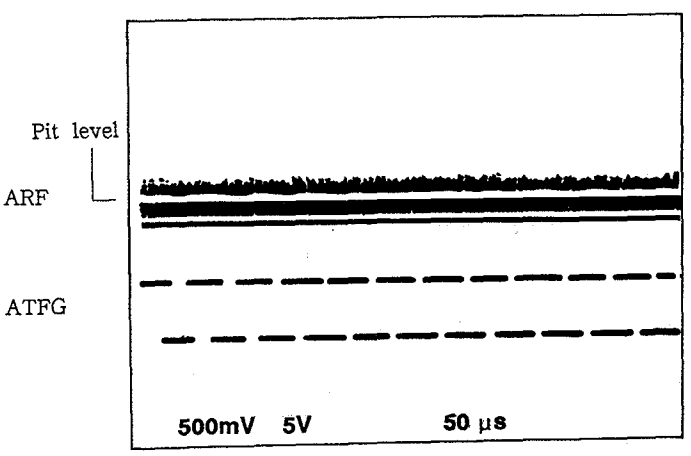
   Sense ↙

   Example : 00 00 00 85

10. Execute the SET WRITE PWR command, and set the most appropriate power.

    Example : Code : 67 1B 85 00 00 00 – – – –

11. Execute the LD ON command.
    Adjust RV303 so that the pit level is minimum, as shown in the figure.



Note : If using the disk which was used in the final test, take the following steps :

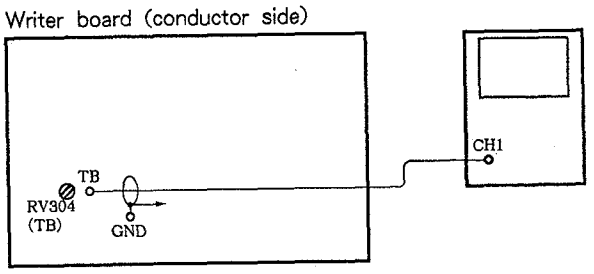
3. Execute the LOCK EFM command.
4. Execute the SPINUP CD-R command.
   Code : 67 28 00 00 00 00 – – – – –
5. Execute the CD-R SEEK command to find where there is no data.
6. Execute the PW CAL command, and set the BIAS adjustment starting position.
   Code : 67 24 00 MM 00 00
7. Execute the READ SENSE command.
8. Execute the SET WRITER PWR command.
9. Execute the SET LD ON command.
10. Adjust RV303.

7-3-2-9. Tracking Bias Adjustment

Preparation

Test disk	:	Blank CD-R or the CD-R used in the final test
Measurement equipment	:	Oscilloscope
Adjustment point	:	RV304 (14H)
Test points	:	TB (14H)

Test point and connection



Procedure

Perform the following steps immediately after the Focus Bias Adjustment :

1. The drive is writing status now.
2. Connect the oscilloscope to the test point.
3. Adjust RV304 so that TB would be as close to zero as possible.
4. Execute STOP command.
5. Turn off the drive power.
6. Remove probes of oscilloscope.

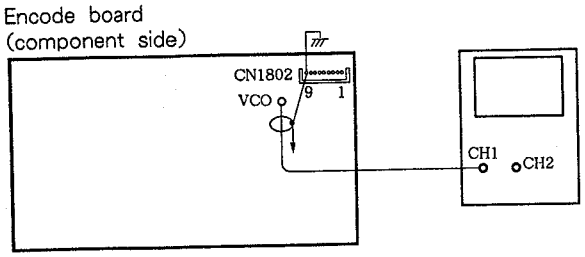
B: Encode Board

7-3-3. PLL Adjustment

Preparation

Test disk	:	Not used
Measurement equipment	:	Oscilloscope
Adjustment point	:	L1821
Test point	:	VCO (B12)

Adjustment point and connection



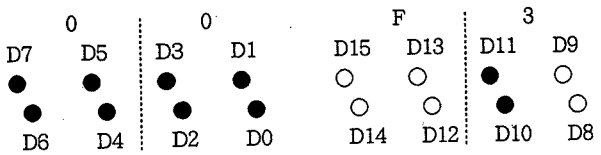
Procedure

1. Ground pin 9 of CN1802.
2. Connect the oscilloscope to the test point.
3. Adjust L1821 so that the following specification is satisfied :

   < Specification > DC voltage 2.2 V $^{+0.1}_{-0.2}$ V

If PLL is not adjusted correctly, LEDs D8 to D15 on the encode board light as follows :

How to identify error codes : PLL unlock error (code : F3)



○ : LED lights.
● : LED goes off.

SECTION 8
ACCEPTANCE TEST

8-1. READ TEST

Perform the following read test first, to check that data is read correctly, before performing the final test (write test).

8-1-1. Check Items

(1) Initial check (Disc identification test)
Perform this check using a CD-R (12 cm or 8 cm) and a CD (12 cm or 8 cm) to check that the unit can identify each disc.
(2) Read Operation Check
Set the disc mentioned above to read status, and check that the CD-R reads ATIP correctly and the normal CD reads SUBQ correctly.

8-1-2. Tools and Measuring Equipment

- Computer : IBM-PC/AT or Quarter-L (PCX-300 series)
- CRT display
- Disc used : CDW-M63, CDW-M74 or CDW-M18
- CDW control I/F card : J-9060-640-A
- ATIP indicator board : J-9095-030-A
- Software (3.5" floppy)
  CDW test/Ver. 1.4E : J-9095-010-A
- Test unit : CDW-900E
- Cables
  ATIP display cable : J-9095-050-A
  BIF cable : RK-B005

8-1-3. Preparation

1. Attaching CDW Control I/F Card
   (Refer to page 7-2.)

2. System Diagram
   (Refer to page 7-2.)

3. Setting CDW-900E DIP Switches
   (Refer to page 7-2.)

4. Removing Connector Connected to CN1501

8-1-4. Testing Procedure

(1) Initial check (Disc identification)

1. Select "B-I/F Commander" from the menu. (Refer to Figure 1.)

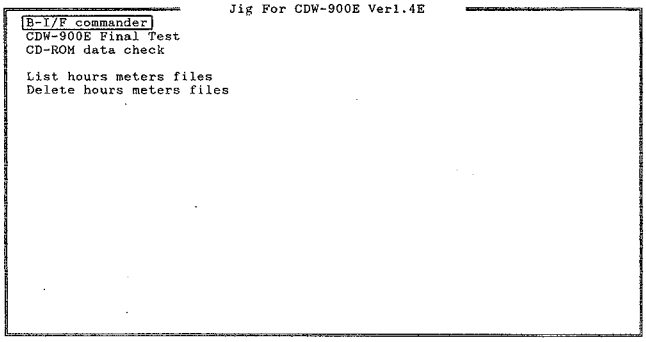


Fig 1.

2. Press the F1 key on the computer, set the drive ID, then press Enter. (Refer to Figure 2.)

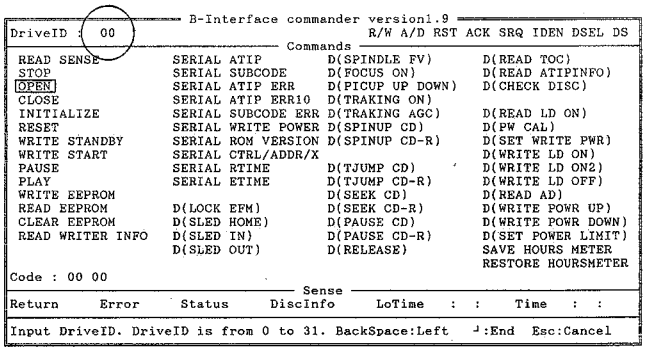


Fig 2.

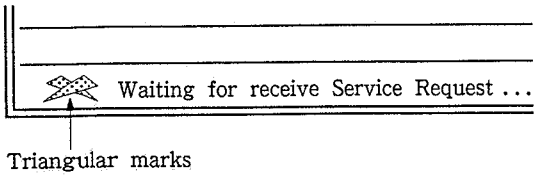
3. Select the "OPEN" command (code : 06 00), and press Enter.
4. Put the disc shown in table 1 to the tray, after that, select the "CLOSE" command (code : 07 00), and press Enter.
5. Select the "RESET" command (code : 0B 00), and press Enter twice.

Note 1 : After resetting, it takes 20 to 30 seconds to display a result because the unit calibrates the internal parameters.
Note 2 : Once the RESET command is executed, the parameter is automatically reset after opening or closing. There is no need to execute the RESET command twice to identify a disc.

6. The displays during and after the execution are as follows :

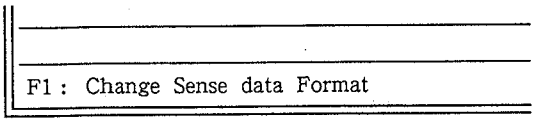
During the execution

Message "Waiting for receive Service Request" appears and these triangular marks rotate.



After the execution

Message "Change Sense data Format" appears.



7. The test result is displayed on the Sense column. (Figure 3)
The following messages indicates that the test is complete.

1. ERROR 00---No error (Refer to the Appendix in the B-I/F command.)
2. STATUS 02
3. Disc Info (Refer to Table 1.)

MEDIA	DISC SIZE (cm)	Disc Info
CD-R	12	12
	8	11
Normal CD	12	06
	8	05

Table 1.

(Example) 12 cm CD-R

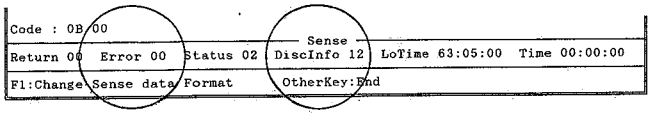

Code : 0B 00
Sense
Return 00 Error 00 Status 02 DiscInfo 12 LoTime 63:05:00 Time 00:00:00
F1:Change Sense data Format OtherKey:End

Fig 3.

Note : When an error occurs, refer to SECTION 6 "TROUBLESHOOTING" to diagnose the error.

(2) Read test

1. For CD-R
Select D (SPINUP CD-R/code: 67 28), and press Enter.
For a normal CD, select D (SPINUP CD/code: 67 27), and press Enter.
2. If the time code in the SENSE column is incremented every time Enter is pressed, read test is OK. (Figure 4, 5)
3. Perform this test for 12 cm and 8 cm CD-Rs and a 12 cm and 8 cm CDs.

< CDW-M63 >

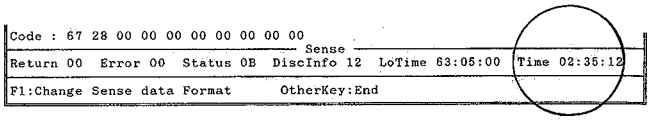

Code : 67 28 00 00 00 00 00 00 00 00
Sense
Return 00 Error 00 Status 0B DiscInfo 12 LoTime 63:05:00 Time 02:35:12
F1:Change Sense data Format OtherKey:End

Fig 4.

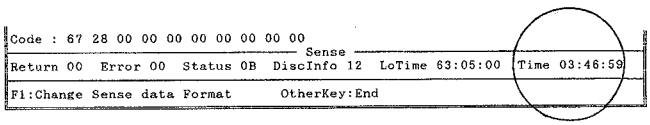

Code : 67 28 00 00 00 00 00 00 00 00
Sense
Return 00 Error 00 Status 0B DiscInfo 12 LoTime 63:05:00 Time 03:46:59
F1:Change Sense data Format OtherKey:End

Fig 5.

8-2. HDD INSTALLATION PROGRAM

General

This program is used to install sample data on a hard disk.

Perform this only once at setting up.

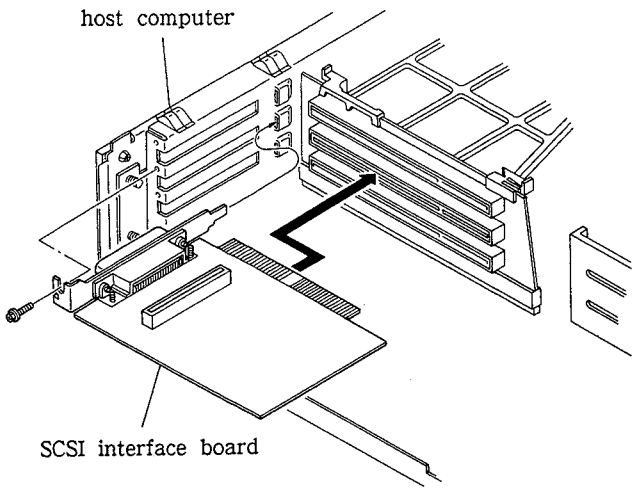
The sample data is used to final test a CDW-900E.

8-2-1. Equipment Used

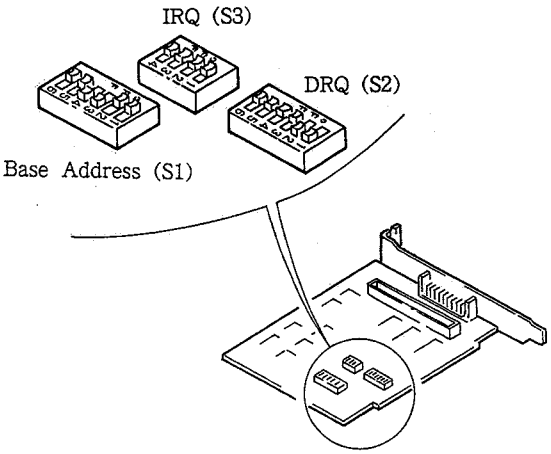
- Computer : IBM-PC/AT or Quarter-L (PCX-300 series)
- CRT display
- CD-ROM drive : CDU-6111 or a set which can handle SCSI
- Disc used : CDW-M63 or CDW-M74
- Special disk : Supplied by Data Storage
- SCSI interface board : J-9070-120-A
- Hard disk : 40 MB or more
- Switching regulator for hard disk
- CDW-900E
- Software (3.5" floppy)
  HDD INSTALL/Ver. 1.0 : J-9095-060-A
- Cables
  SCSI cable : RCC-015H 2 pcs
  : RK-B1510 1 pcs
  SCSI exchange cable : 1-590-216-11
  SCSI terminator : 1-512-026-11

8-2-2. Preparation

(1) Remove the computer panel, and attach the SCSI interface board as shown in the following figure :



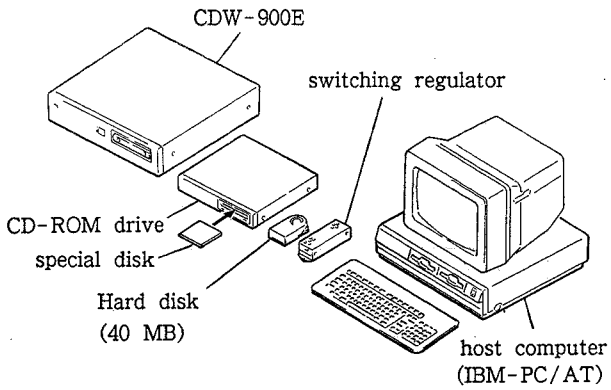
(2) Set the DIP Switches :



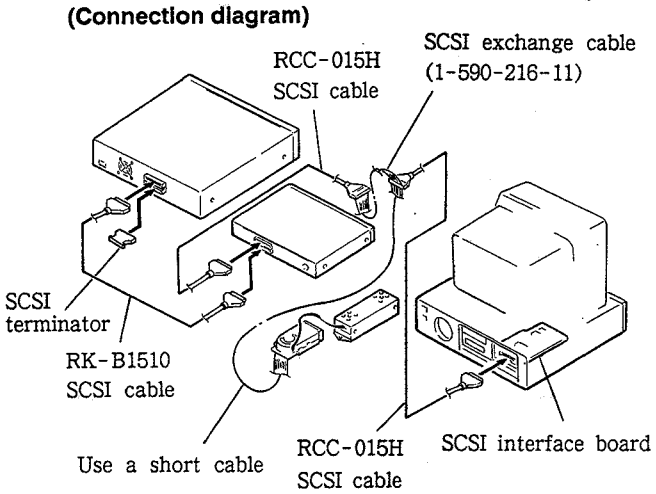
I/O Address (SW1) : 330
DRQ channel (SW2) : 0ch/DACK 3
IRQ channel (SW3) : Invalidity

8-2-3. Configuration and connecting diagram

(System diagram)



(Connection diagram)



8-2-4. Setting each ID

Unit	Setting of ID
CDW-900E	1 (default)
* CD-ROM drive	6
Hard disk	0 (default)

Note : Refer to User's Guide of CD-ROM drive.

8-2-5. Operation

①. Insert the hard disk installation software in drive A, and turn the computer on.
The following menu appears :

```
OHProject Menu Program version1.0
HDD Installation for Final Test
make Special Disc for HDD Install
```

②. Select "HDD Installation for Final Test", and press the return key.
The message prompts you to insert the special disk.

```
A:\>cd \wt

A:\WT>copy hdins-r.dat hdins.dat
        1 File(s) copied

A:\WT>echo off
*
* Please insert SPECIAL DISC for HDD Installation to CD-ROM Drive.
*
Strike a key when ready . . .
```

③. Insert the special disc, which is in a caddy on CD-ROM drive, and press the return key.
"WRITE DATA INSTALL UTILITY/V1.0" appears, and data is automatically written to the hard disk from the CD-ROM drive.

④. When data is written up to block No : 558 without error, "COMPLETE" appears in the lower half of the display.

```
============================================
   Write data Install Utility ver 1.0
============================================
Port address     330
Target ID        ROM=6  HD=0
Read Mode        ROM ---> HD
Block No.          0 ---> 558



00H : Complete
00H : GOOD
00H : Command Complete
02H : <--- Sence key
3AH : <--- Additional Sence key
     Esc
```

⑤. If a problem on the hard disk prevents data being written, writing stops where the problem occurred.

⑥. To end, press the ESC key.

8-3. FINAL TEST

General

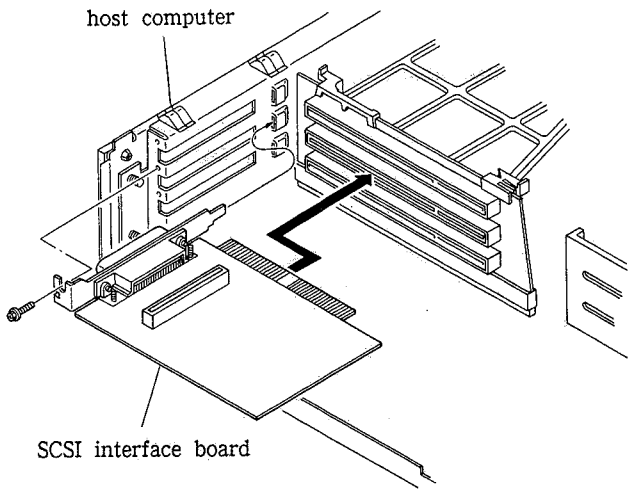
This test is used as final test. It writes the CD-ROM data installed in hard disk to the CD-R disc, and reads out the data from the disc with the CD-ROM drive to verify the original data and the read-out data on the host computer.

8-3-1. Equipment Used

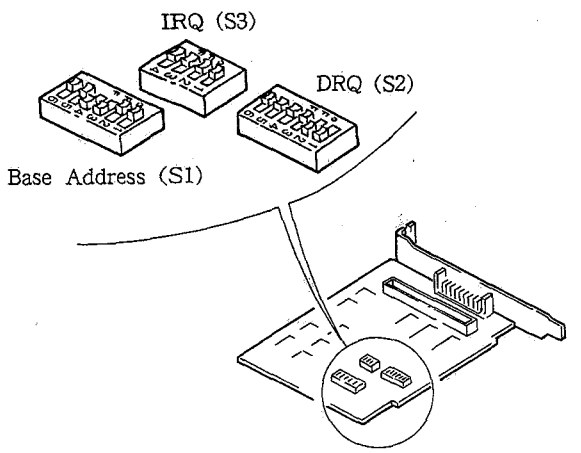
- Computer : IBM-PC/AT or Quarter-L (PCX-300 series)
- CRT display :
- CD-ROM drive : CDU-6111 or a model which can handle SCSI.
- Disc used : CDW-M63 or CDW-M74
- SCSI interface board : J-9070-120-A
- Hard disk (40 MB) : HDD Installation for Final Test must be installed.
- CDW-900E
- Software (3.5" floppy)
  CDW Test/Ver. 1.4E : J-9095-010-A
- Connecting Cables :
  SCSI cable (50 P) : RCC-015H 2 pcs
  : RK-B1510 1 pc
  SCSI exchange cable : 1-590-216-11 1 pc
- Switching regulator for hard disk 1 pc
  SCSI terminator : 1-512-026-11 1 pc

8-3-2. Preparation

(1) Remove the computer panel and attach the SCSI interface board as shown in the following figure :



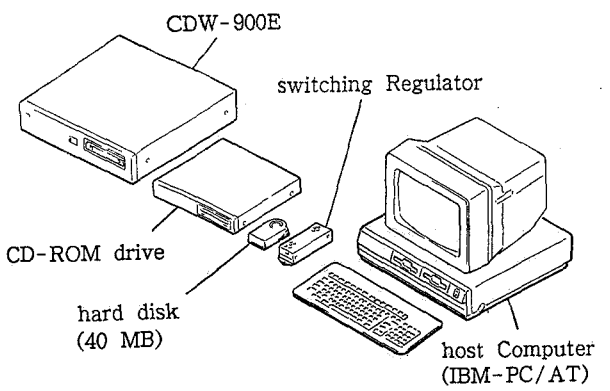
(2) Set the DIP Switches



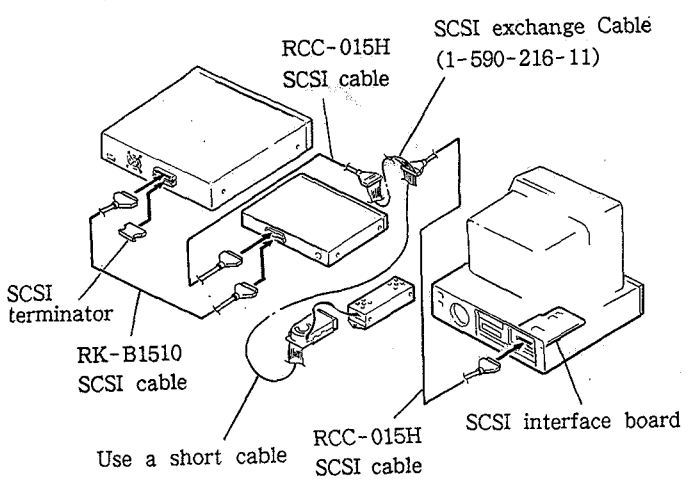
I/O Address (SW1) : 330
DRQ channel (SW2) : 0ch/DACK 3
IRQ channel (SW3) : Invalidity

8-3-3. Configuration and Connecting Diagrams

(System diagram)



(Connection diagram)



8-3-4. Setting Each ID

	Each set	ID setting
	Set tested (CDW-900E)	1 (default)
*	CD-ROM drive	6
	Hard disk	0. (default)

* **Note** : Refer to User's Guide for CD-ROM drive.

8-3-5. Opertation

Writing test

Procedure

(1) Insert the CDW Test/Ver. 1.4E disk (3'5") to the computer, and turn the power on.

(2) Check that the starting display appears as follows :

```
                    Jig For CDW-900E Ver1.4E
B-I/F commander
CDW-900E Final Test
CD-ROM data check

List hours meters files
Delete hours meters files
```

(3) Select the "CDW-900E Final Test" menu with the cursor, and press the enter key. Check that the following display appears.
The CDW-900E tray opens automatically.

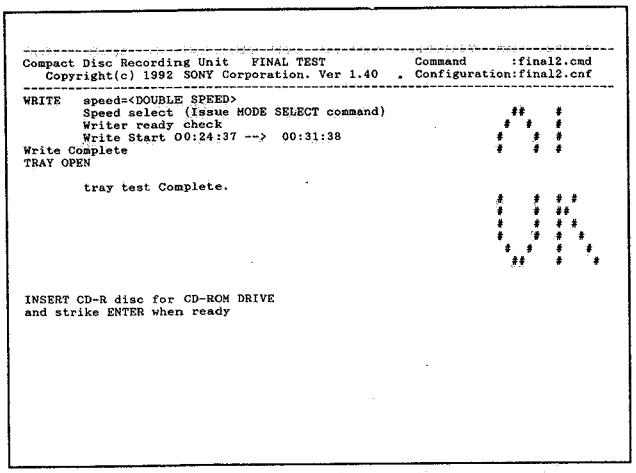
```
Compact Disc Recording Unit   FINAL TEST          Command       :final2.cmd
   Copyright(c) 1992 SONY Corporation. Ver 1.40   Configuration:final2.cnf
 SCSI ID 01 : [CDW] Initialize
 SCSI ID 00 : [HD ] Initialize
 SCSI ID 06 : [ROM] Initialize
TRAY OPEN
        Writer ready check
        tray test Complete.
          Insert CD-R disc.

Press Any Key

00H : GOOD
Sense key              00H          Additional Sense key  00H
Additional infomation 00000000      Encoder status        00H
```

(4) Put an unused disc (CDW-M63 or CDW-M74) on the CDW-900E tray.

Note: Be sure to use a new disc.

(5) Press any key.
The "WRITE" and "X 2 SPEED" LEDs light and the machine automatically starts to write. (Approx. 8 seconds)

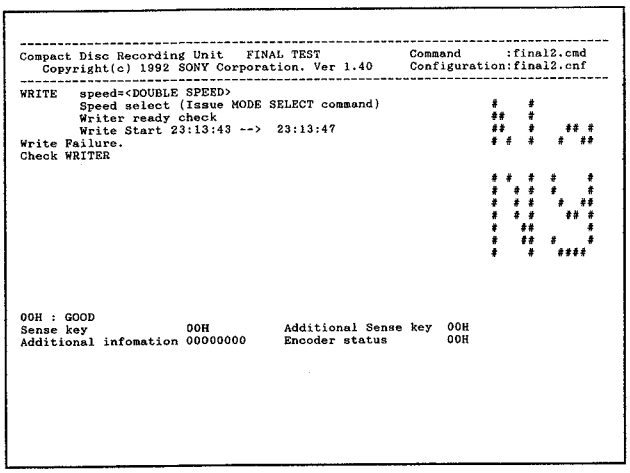
(6) When writing is complete, "OK" appears on the right side of the display, and "Write Complete" is displayed.


Compact Disc Recording Unit FINAL TEST Command :final2.cmd
Copyright(c) 1992 SONY Corporation. Ver 1.40 Configuration:final2.cnf
WRITE speed=<DOUBLE SPEED>
Speed select (Issue MODE SELECT command)
Writer ready check
Write Start 00:24:37 --> 00:31:38
Write Complete
TRAY OPEN
tray test Complete.
INSERT CD-R disc for CD-ROM DRIVE
and strike ENTER when ready

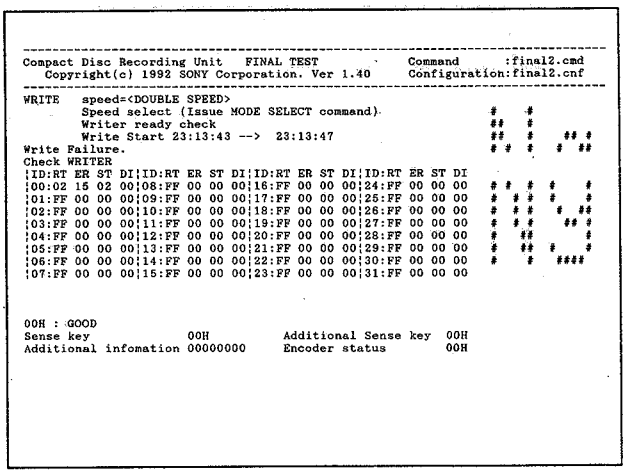
If data is not written correctly, "Ng" or "Write Failure" appears.
If "Ng" appears on the display, proceed to step (7).

(7) Immediately after "Ng" appears on the display, the ID address and error code are displayed.

(Ng display)


Compact Disc Recording Unit FINAL TEST Command :final2.cmd
Copyright(c) 1992 SONY Corporation. Ver 1.40 Configuration:final2.cnf
WRITE speed=<DOUBLE SPEED>
Speed select (Issue MODE SELECT command)
Writer ready check
Write Start 23:13:43 --> 23:13:47
Write Failure.
Check WRITER
00H : GOOD
Sense key 00H Additional Sense key 00H
Additional infomation 00000000 Encoder status 00H

(ID address and error code display)


Compact Disc Recording Unit FINAL TEST Command :final2.cmd
Copyright(c) 1992 SONY Corporation. Ver 1.40 Configuration:final2.cnf
WRITE speed=<DOUBLE SPEED>
Speed select (Issue MODE SELECT command)
Writer ready check
Write Start 23:13:43 --> 23:13:47
Write Failure.
Check WRITER
00H : GOOD
Sense key 00H Additional Sense key 00H
Additional infomation 00000000 Encoder status 00H

Check the error code and its contents on the display, and proceed to **SECTION 6. "TROUBLE SHOOTING"** to diagnose.

(8) To end, press the ESC key. The starting display appears.

(9) To exit, press C while holding down the control key.

Verify Written Contents Test.

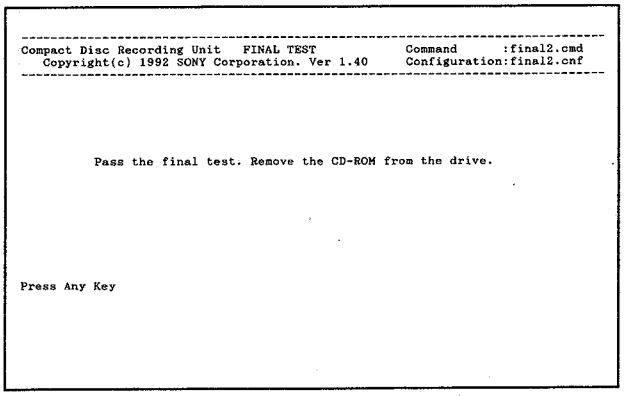
(1) When written contents are verified immediately after writing

Procedure

① Take out the disc which has been written from the CDW-900E tray. Put it into a caddy, and insert the caddy into the CD-ROM drive.

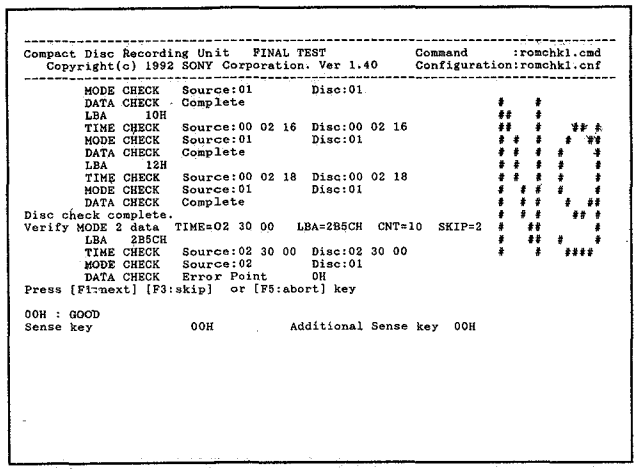
② Press the return key, and the contents of the disk are automatically verified. (This test takes approx. 10 seconds)
"OK" or "Ng" is displayed for each mode.

③ This final test is complete when the written contents have been verified and "Pass the final test" (Contents verified) appears.
If "Ng" appears, proceed to step ⑤.

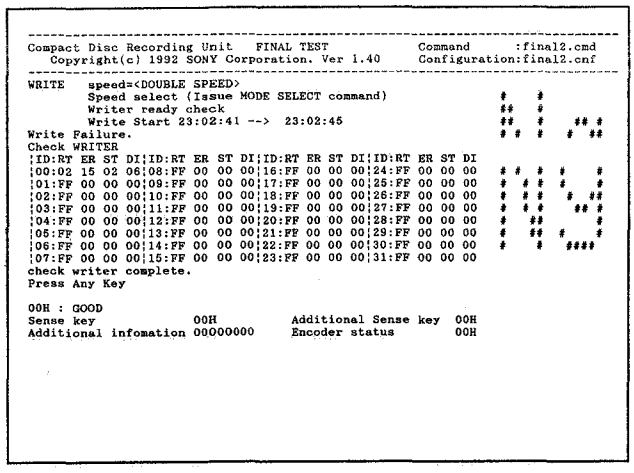

Compact Disc Recording Unit FINAL TEST Command :final2.cmd
Copyright(c) 1992 SONY Corporation. Ver 1.40 Configuration:final2.cnf
Pass the final test. Remove the CD-ROM from the drive.
Press Any Key

④ After completion, press the ESC key on the keyboard to return to the starting display.

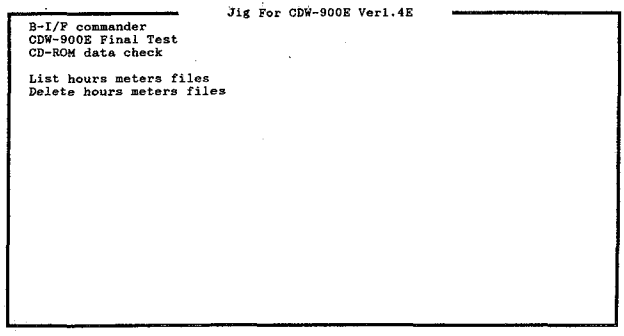
⑤ If an error occurs during this test, "Ng" appears and data checking stops.


Compact Disc Recording Unit FINAL TEST Command :romchk1.cmd
Copyright(c) 1992 SONY Corporation. Ver 1.40 Configuration:romchk1.cnf
MODE CHECK Source:01 Disc:01
DATA CHECK Complete
LBA 10H
TIME CHECK Source:00 02 16 Disc:00 02 16
MODE CHECK Source:01 Disc:01
DATA CHECK Complete
LBA 12H
TIME CHECK Source:00 02 18 Disc:00 02 18
MODE CHECK Source:01 Disc:01
DATA CHECK Complete
Disc check complete.
Verify MODE 2 data TIME=02 30 00 LBA=2B5CH CNT=10 SKIP=2
LBA 2B5CH
TIME CHECK Source:02 30 00 Disc:02 30 00
MODE CHECK Source:02 Disc:01
DATA CHECK Error Point 0H
Press [F1:next] [F3:skip] or [F5:abort] key
00H : GOOD
Sense key 00H Additional Sense key 00H

Press F1 [NEXT] to check the ID address and error code.


Compact Disc Recording Unit FINAL TEST Command :final2.cmd
Copyright(c) 1992 SONY Corporation. Ver 1.40 Configuration:final2.cnf
WRITE speed=<DOUBLE SPEED>
Speed select (Issue MODE SELECT command)
Writer ready check
Write Start 23:02:41 --> 23:02:45
Write Failure.
Check WRITER
check writer complete.
Press Any Key
00H : GOOD
Sense key 00H Additional Sense key 00H
Additional infomation 00000000 Encoder status 00H

Press F5 [ABORT] to end the data check and return to the menu.



Check the error code contents on the display shown above, and refer to **SECTION 6 "TROUBLESHOOTING"** to diagnose the error.

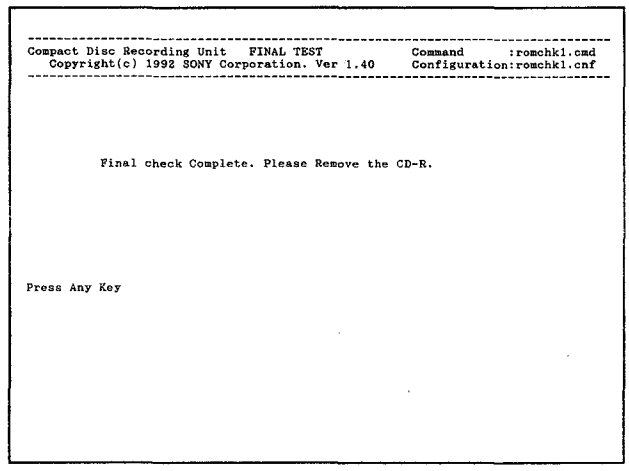
(2) When the written contents are verified at other times

① Select the "CD-ROM DATA CHECK" menu from the starting display, and press the enter key.

② Put a disc which already contains data in a caddy, and insert the caddy and disk into the CD-ROM drive.

③ Press any key and the contents of the disk are automatically verified.

④ When the written contents have been verified, "Final Check Complete" appears if there is no error.


Compact Disc Recording Unit FINAL TEST Command :romchk1.cmd
Copyright(c) 1992 SONY Corporation. Ver 1.40 Configuration:romchk1.cnf
Final check Complete. Please Remove the CD-R.
Press Any Key

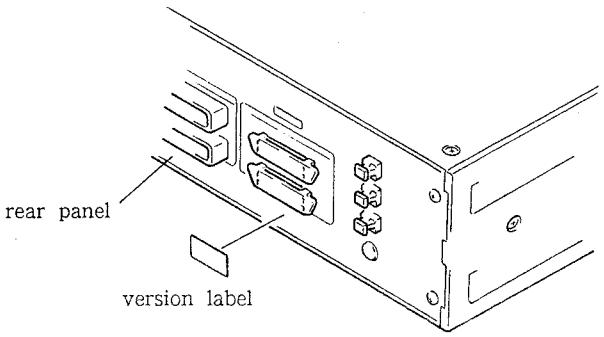
SECTION 9
SERVICE INFORMATION

9-1. UPDATING TO THE VERSION E

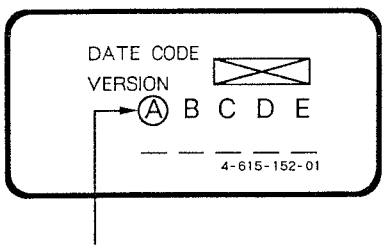
Monitor the Technical News for information on how to update to the unit version after version E.

9-1-1. Checking the version label

CDW-900E has five versions from A to E.
When repairing CDW-900E, check the version label (4-615-152-01) at the rear panel.
Update to the latest version to stabilize the operation.
The latest version is E.



Version label

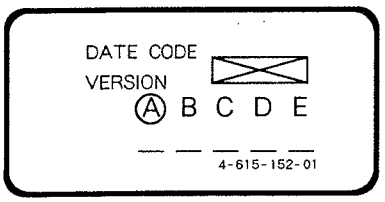


This mark indicates the unit is version A.

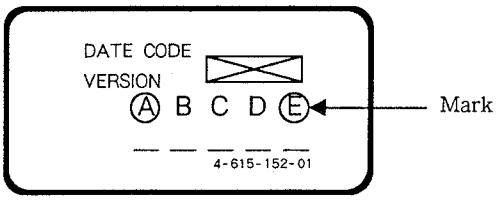
9-1-2. Marking after updating

After updating the unit to the latest version (version E), mark that fact on the version label.

Before version update



After version update



9-1-3. Part number of board on each version

Version	A	B C D	E
WRITER board part No.	1-643-496-11	1-643-496-12	1-643-496-13
ENCODE board part No.	1-643-495-11	1-643-495-12	

9-1-4. Modification (how to update)

Version A or B

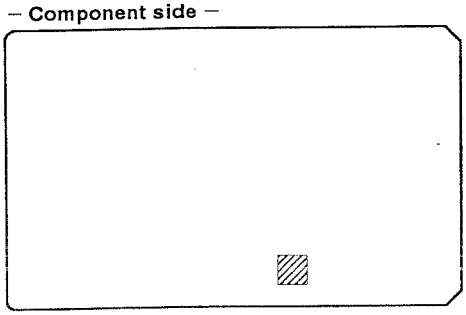
Perform the following steps (1) to (5) for version A or B units.
In addition, version B units require steps (6).(WRITER board)

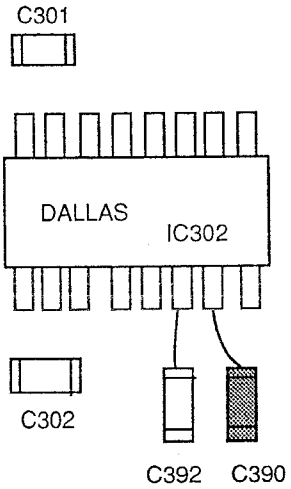
(1) Change the tracking AGC circuit

Ref.No.		Part No.	Description
C390	FORMER	1-163-101-00	CERAMIC CHIP 22P 5% 50V
	NEW	1-163-117-00	CERAMIC CHIP 100P 5% 50V

Address J11

– Component side –



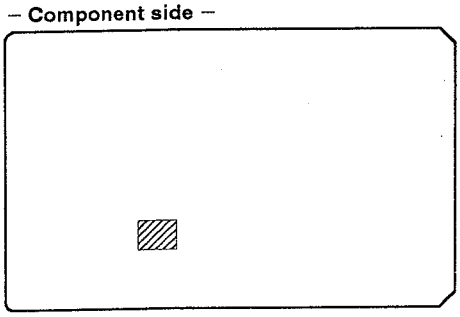


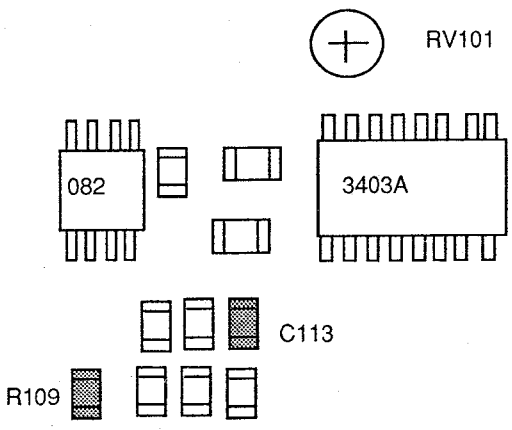
(2) Change the write APC circuit

Ref.No.		Part No.	Description
C113	FORMER	1-164-699-11	CERAMIC CHIP 0.0033MF 5% 50V
	NEW	1-163-989-11	CERAMIC CHIP 0.033MF 10% 25V
R109	FORMER	1-216-097-00	METAL GLAZE 100K 5% 1/10W
	NEW	1-216-073-00	METAL GLAZE 10K 5% 1/10W

Address I6

– Component side –



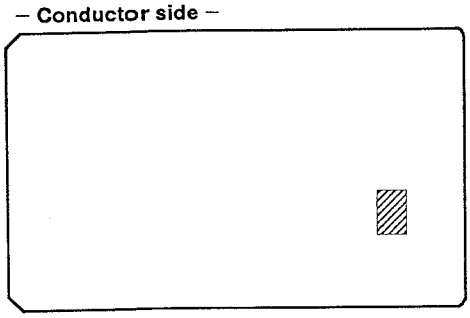


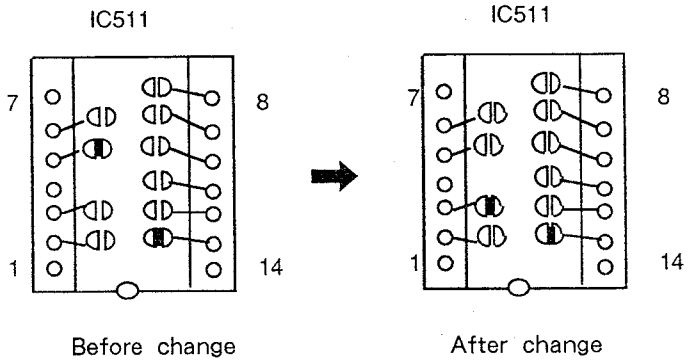
(3) Change the delay line tap

IC511 tap 5 → 3

Address G3

– Conductor side –



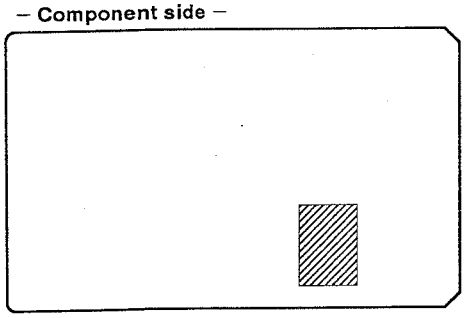


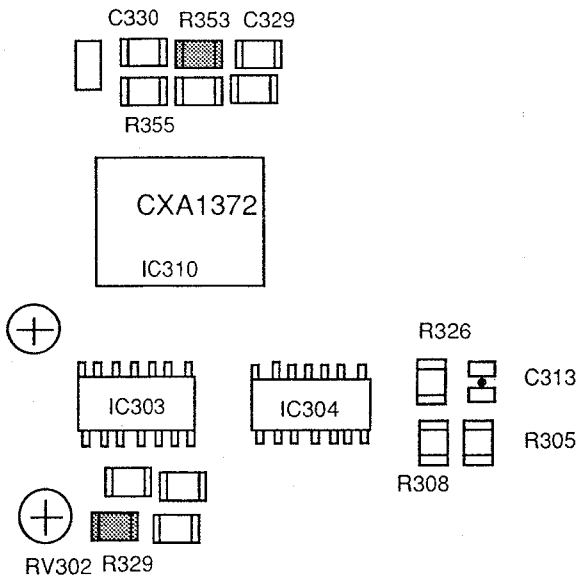
(4) Change the tracking servo circuit

Ref.No.		Part No.	Description
R329	FORMER	1-216-089-00	METAL GLAZE 47K 5% 1/10W
	NEW	1-216-097-00	METAL GLAZE 100K 5% 1/10W
R353	FORMER	1-216-111-00	METAL GLAZE 390K 5% 1/10W
	NEW	1-216-117-00	METAL GLAZE 680K 5% 1/10W
C313	Addition	1-163-131-00	CERAMIC CHIP 390PF 5% 50V

Address H12

– Component side –





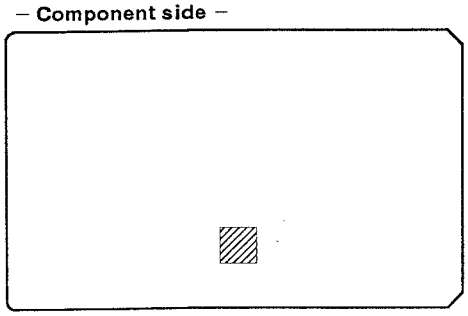
• After updating, adjust the tracking servo loop gain.

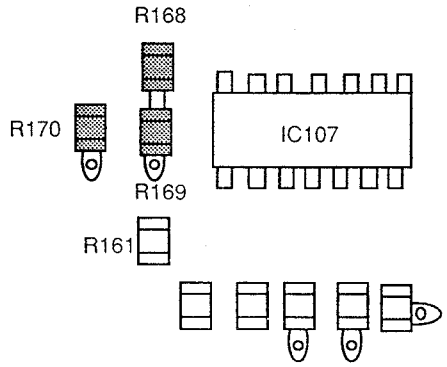
(5) Change the asymmetry circuit

Ref.No.		Part No.	Description
R168	FORMER	1-216-677-11	METAL CHIP 12K 0.50% 1/10W
	NEW	1-216-656-11	METAL CHIP 1.6K 0.50% 1/10W
R169	FORMER	1-216-643-11	METAL CHIP 470 0.50% 1/10W
	NEW	1-216-629-11	METAL CHIP 120 0.50% 1/10W
R170	FORMER	1-216-675-11	METAL CHIP 10K 0.50% 1/10W
	NEW	1-216-654-11	METAL CHIP 1.3K 0.50% 1/10W

Address I9

– Component side –





Version B only

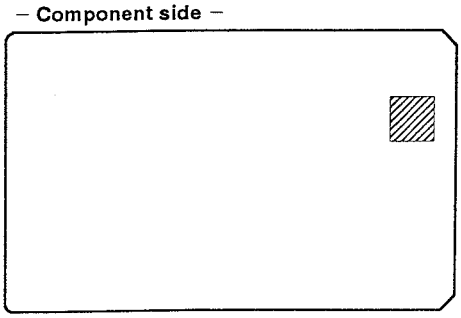
Perform the following step for version B units.

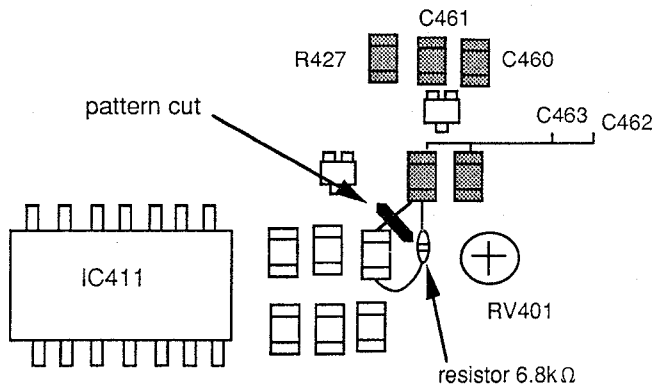
(6) Change the spindle circuit

Ref.No.		Part No.	Description
C460, C461	FORMER	1-135-179-21	TANTAL CHIP 2.2MF 10% 16V
	NEW	1-135-201-11	TANTAL CHIP 10MF 20% 4V
C462, C463	FORMER	1-164-004-11	CERAMIC CHIP 0.1MF 10% 25V
	NEW	1-164-489-11	CERAMIC CHIP 0.22MF 10% 16V
R427	FORMER	1-216-089-00	METAL GLAZE 47K 5% 1/10W
	NEW	1-216-081-00	METAL GLAZE 22K 5% 1/10W
R490	Addition	1-249-427-11	CARBON 6.8K 5% 1/10W
Pattern cut : one place			

Address D16

– Component side –





• After updating, adjust the spindle bias.

Version C

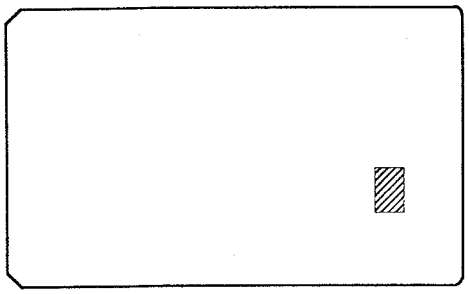
Perform the following steps (1) to (3) for version C units. (WRITER board)

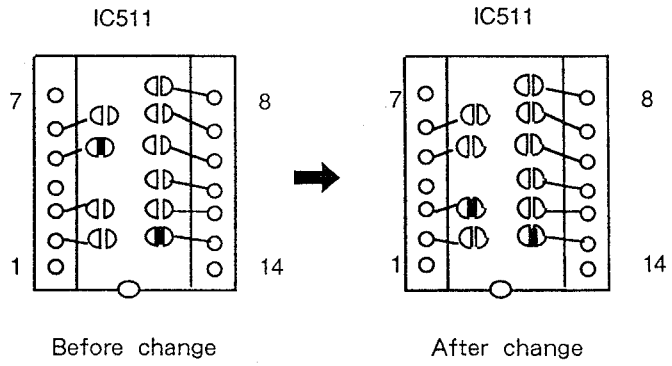
(1) Change the delay line tap

IC511 tap 5 → 3

Address G3

– Conductor side –



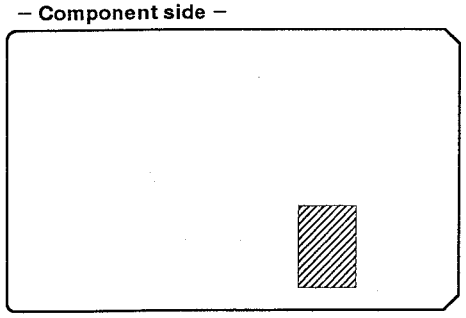


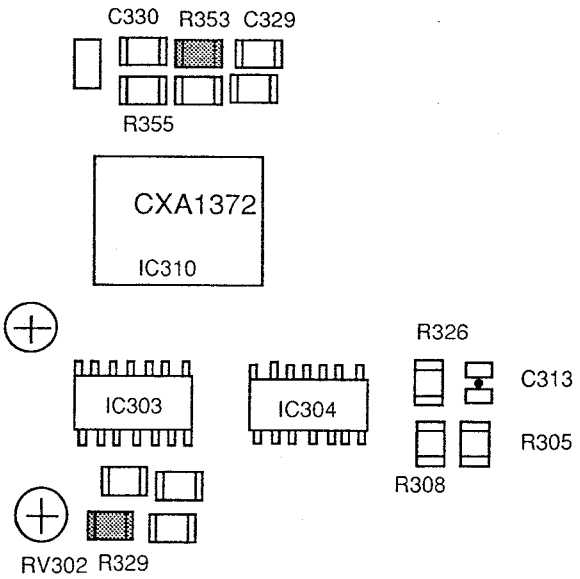
(2) Change the tracking servo circuit

Ref.No.		Part No.	Description
R329	FORMER	1-216-089-00	METAL GLAZE 47K 5% 1/10W
	NEW	1-216-097-00	METAL GLAZE 100K 5% 1/10W
R353	FORMER	1-216-111-00	METAL GLAZE 390K 5% 1/10W
	NEW	1-216-117-00	METAL GLAZE 680K 5% 1/10W
C313	Addition	1-163-131-00	CERAMIC CHIP 390PF 5% 50V

Address H12

– Component side –





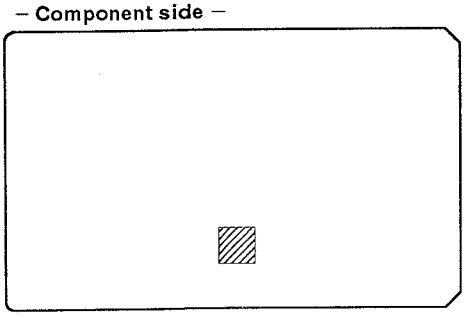
• After updating, adjust the tracking servo loop gain.

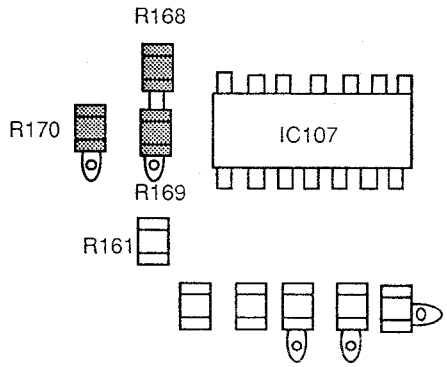
(3) Change the asymmetry circuit

Ref.No.		Part No.	Description
R168	FORMER	1-216-677-11	METAL CHIP 12K 0.50% 1/10W
	NEW	1-216-656-11	METAL CHIP 1.6K 0.50% 1/10W
R169	FORMER	1-216-643-11	METAL CHIP 470 0.50% 1/10W
	NEW	1-216-629-11	METAL CHIP 120 0.50% 1/10W
R170	FORMER	1-216-675-11	METAL CHIP 10K 0.50% 1/10W
	NEW	1-216-654-11	METAL CHIP 1.3K 0.50% 1/10W

Address I9

– Component side –





Version D

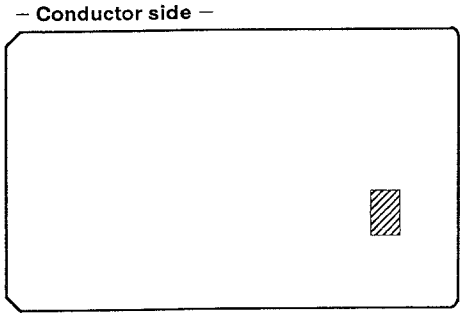
Perform the following step for version D units. (WRITER board)

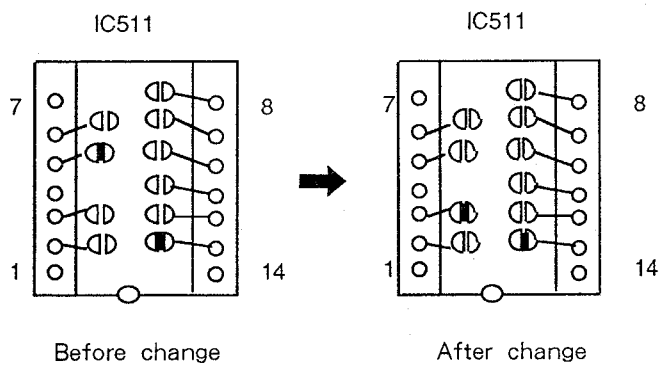
(1) Change the delay line tap

IC511 tap 5 → 3

Address G3

– Conductor side –

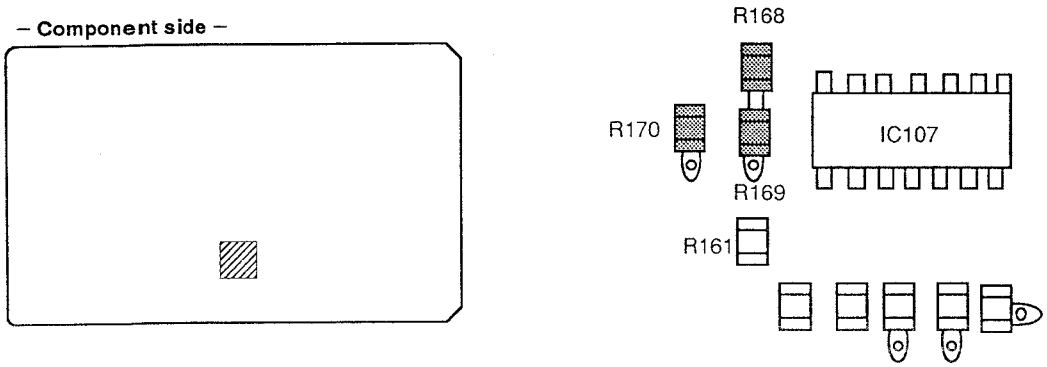




(2) Changing the asymmetry circuit

Ref.No.		Part No.	Description
R168	FORMER	1-216-677-11	METAL CHIP 12K 0.50% 1/10W
	NEW	1-216-656-11	METAL CHIP 1.6K 0.50% 1/10W
R169	FORMER	1-216-643-11	METAL CHIP 470 0.50% 1/10W
	NEW	1-216-629-11	METAL CHIP 120 0.50% 1/10W
R170	FORMER	1-216-675-11	METAL CHIP 10K 0.50% 1/10W
	NEW	1-216-654-11	METAL CHIP 1.3K 0.50% 1/10W

Address I9



9-2. CHANGING ROMS

9-2-1. Writer board

After updating the writer board, change the ROM (IC702) to the latest version (1.12).

Ref.No.	Version	Part No.	Description
FORMER	A	– – – –	AC27C1024-WTR1.06
	B	– – – –	AC27C1024-WTR1.08
	C	– – – –	AC27C1024-WTR1.10
	D	– – – –	AC27C1024-WTR1.11
NEW	E	8-759-164-38	AC27C1024-WTR1.12

9-2-2. Encode board

Though it is not necessary to modify the encode board, change the ROM (IC1111) to the latest version (1.14).

Ref.No.	Version	Part No.	Description
FORMER	A	– – – –	AC27C1024-ENC1.10
	B, C, D	– – – –	AC27C1024-ENC1.12
NEW	E	8-759-164-37	AC27C1024-ENC1.14

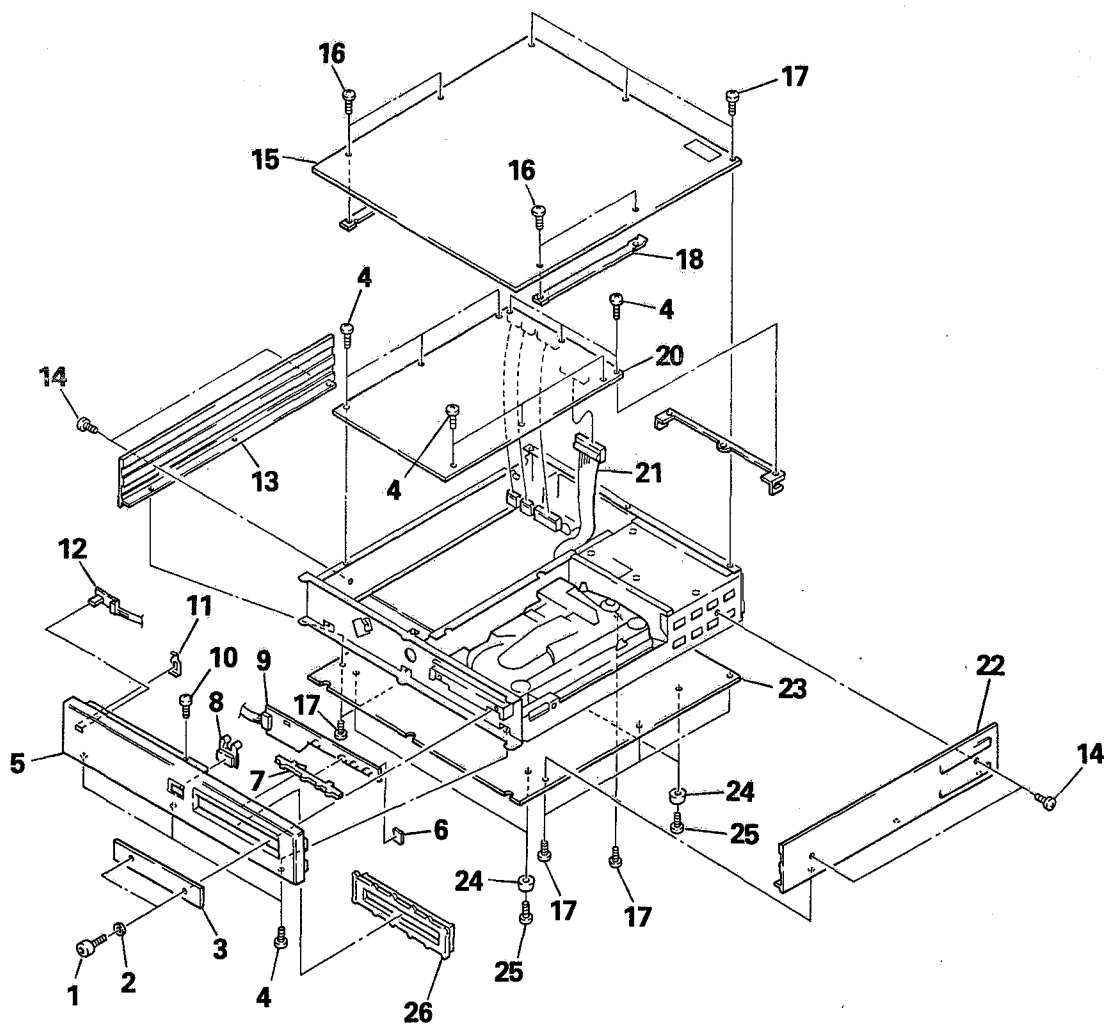
SECTION 10
EXPLODED VIEWS

NOTE:

- The mechanical parts with no reference number in the exploded views are not supplied.
- The construction parts of an assembled part are indicated with a collation number in the remark column.
- Items marked "*" are not stocked since they are seldom required for routine service. Some delay should be anticipated when ordering these items.
- Due to standardization, parts with part number suffix-XX and -X may be different from the parts specified in the components used on the set.

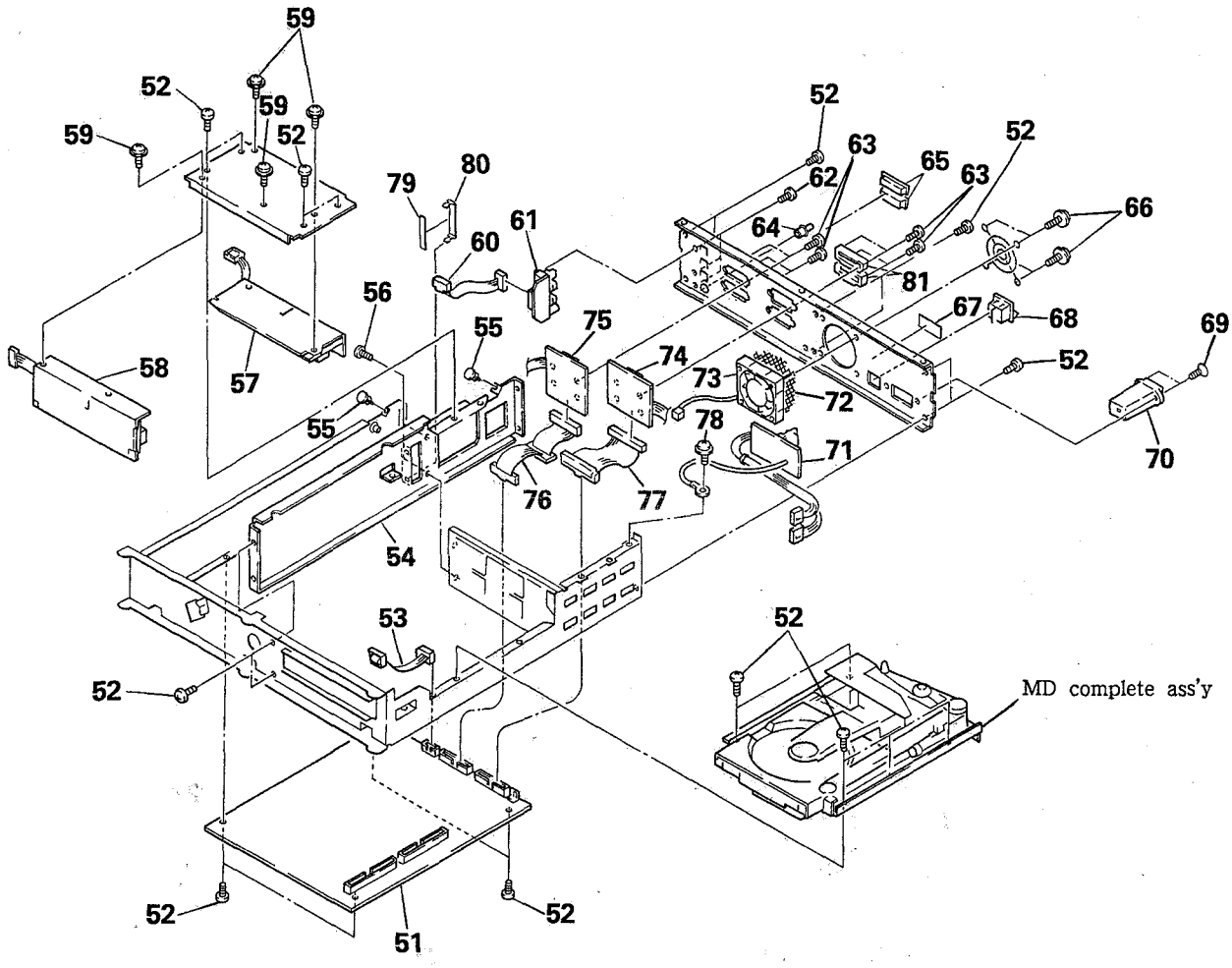
The components identified by mark ⚠ or dotted line with mark ⚠ are critical for safety. Replace only with part number specified.
Les composants identifiés par une marque ⚠ sont critiques pour la sécurité. Ne les remplacer que par une pièce portant le numéro spécifié.

(1)



Ref. No.	Part No.	Description	Remark
1	4-942-333-11	SCREW, ORNAMENTAL	
2	7-688-002-03	W 2.6, MIDDLE	
3	4-623-179-02	PLATE, ORNAMENTAL, TRAY	
4	7-685-871-01	SCREW +BVTT 3X6 (S)	
5	A-8030-908-A	PANEL ASSY, FRONT	
6	9-911-839-XX	RUBBER, SPACER	
7	*4-623-180-01	SPRING, FITTING, LED	
8	4-623-172-01	BUTTON, EJECT	
9	*1-642-908-11	PC BOARD, FU-1	
10	7-685-751-09	SCREW +PTT 3X6 (S)	
11	*4-623-174-01	SPRING, LEAK, ELECTROSTATIC	
12	*1-642-909-11	PC BOARD, PI-1	
13	4-623-189-01	PLATE, SIDE, LEFT	
14	7-682-559-04	SCREW +B 4X5	
15	*4-623-193-01	PLATE, TOP	
16	4-623-157-01	SCREW, CABINET	
17	4-924-242-31	SCREW (M3X6), FLAT HEAD	
18	*4-623-170-01	BRACKET, TOP PLATE	
19	----------		
20	*A-8051-896-A	COMPLETE PCB, WRITER	
21	1-690-839-11	CORD, CONNECTION (BU) 34P	
22	4-623-190-01	PLATE, SIDE, RIGHT	
23	*4-623-194-01	PLATE, BOTTOM	
24	X-3556-910-0	FOOT ASSY, MF	
25	4-623-700-01	+PSW (SMALL ROUND) 3X10	
26	*4-623-173-01	RETAINER, ORNAMENTAL, TRAY	

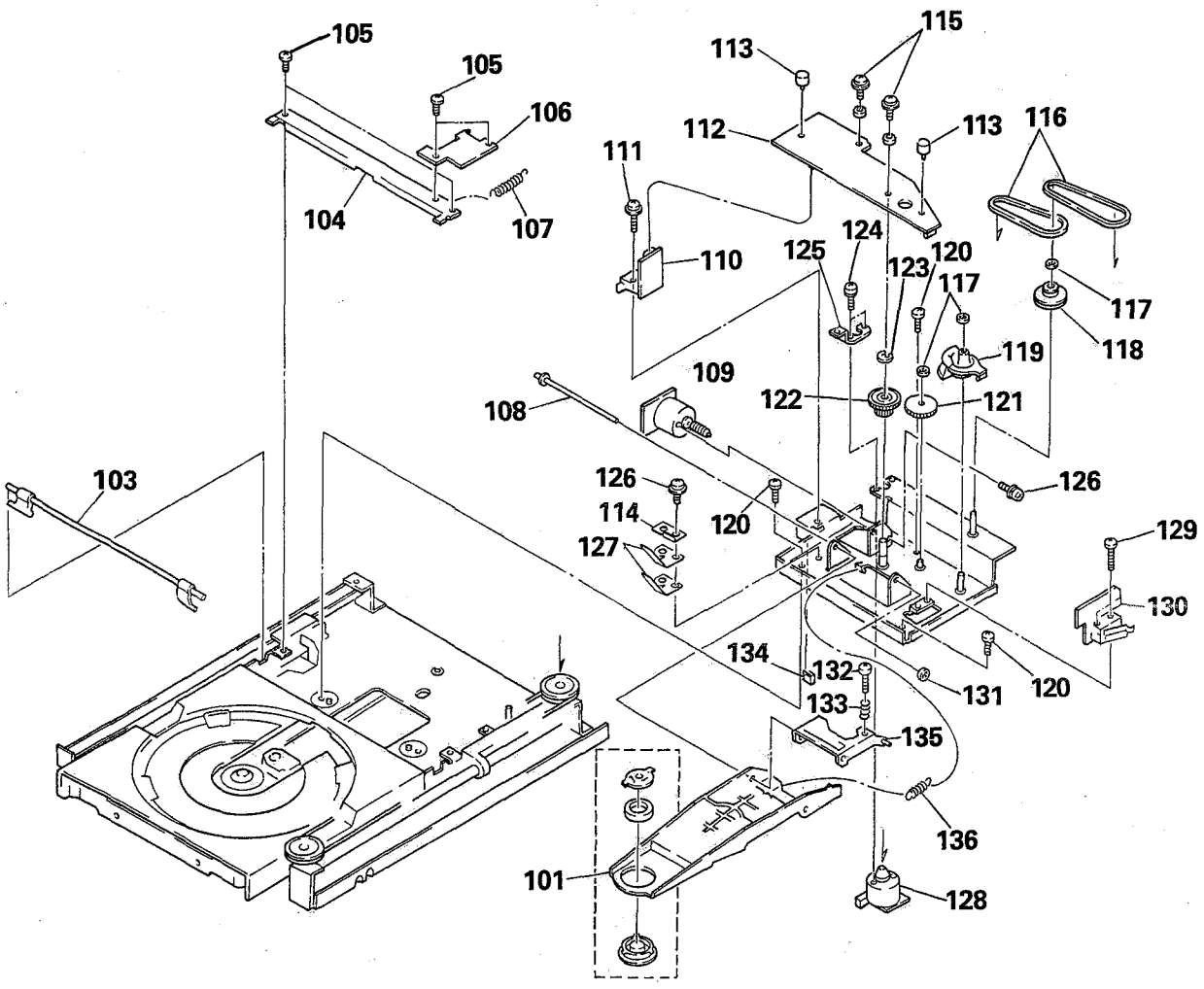
(2)



Ref.No.	Part No.	Description	Remark
51	*A-8051-895-A	COMPLETE PCB, ENCODER	
52	7-685-871-01	SCREW +BVTT 3X6 (S)	
53	1-690-843-11	CORD, CONNECTION (EFM) 10P	
54	*A-8030-881-B	FRAME BLOCK ASSY, INNER	
55	3-646-090-00	RIVET, NYLON	
56	7-685-547-19	SCREW +BTP 3X10 TYPE2 N-S	
57	⚠1-413-728-12	SWITCHING REGULATOR (LW30-53)	
58	⚠1-413-727-12	SWITCHING REGULATOR (LW30-52)	
59	7-682-947-01	SCREW +PSW 3X6	
60	1-690-842-11	CORD, CONNECTION (TOSLINK) 16P	
61	A-8080-765-A	MOUNTED PCB, OPL	
62	7-685-647-79	SCREW +BVTP 3X10 TYPE2	
63	7-627-854-28	SCREW, PRECISION +P 2.6X4.5 TYPE3	
64	4-623-855-01	CAP (DIN), CONNECTOR	
65	4-623-854-01	CAP (036), CONNECTOR	
66	7-682-949-01	SCREW +PSW 3X10	

Ref.No.	Part No.	Description	Remark
67	*4-621-544-01	LABEL, LASER (CLASS 1)	
68	1-571-035-21	SWITCH, SEESAW (AC POWER)	
69	7-682-348-09	SCREW +RK 3X8	
70	1-424-074-12	FILTER, NOISE	
71	*1-643-623-11	PC BOARD, AC-1	
72	*4-623-362-01	NET (#60), FAN	
73	1-541-981-11	MOTOR, DC FAN	
74	A-8080-763-A	MOUNTED PCB, SCSI	
75	A-8080-764-A	MOUNTED PCB, BIF	
76	1-690-840-11	CORD, CONNECTION (B-I/F) 34P	
77	1-690-841-11	CORD, CONNECTION (SCSI2) 50P	
78	7-682-961-01	SCREW +PSW 4X8	
79	*4-615-126-21	CUSHION (A)	
80	*4-623-833-01	RELIEF (036), STRAIN	
81	*4-623-856-01	GUIDE (050)	

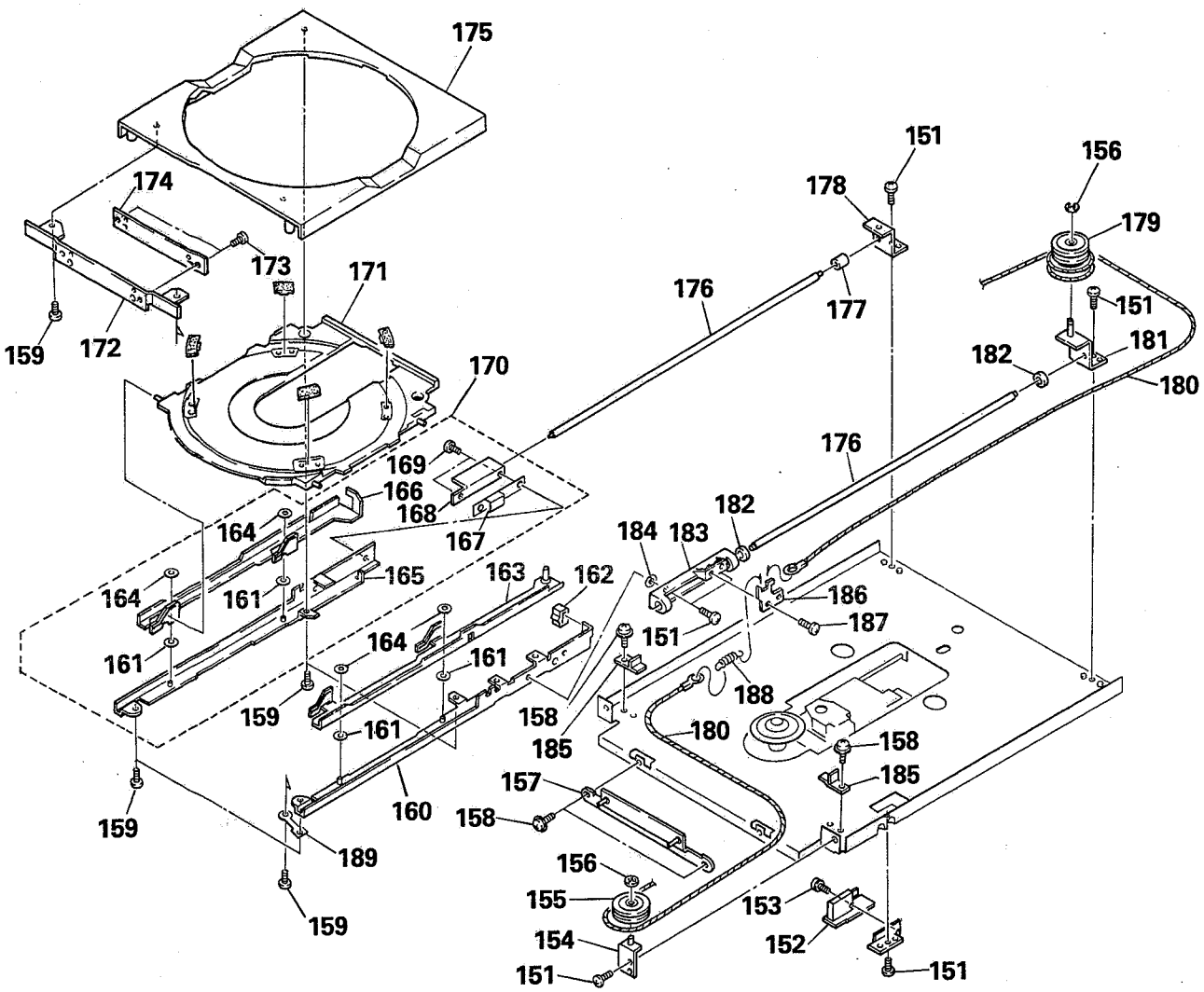
(3)



Ref. No.	Part No.	Description	Remark
101	*X-4912-509-1	ARM ASSY, C	
102	----------		
103	4-908-534-01	LEVER, FUNCTION	
104	*4-912-532-01	REINFORCEMENT, TABLE	
105	7-685-871-01	SCREW +BVTT 3X6 (S)	
106	*4-912-522-01	PLATE, SW	
107	4-912-516-01	SPRING (DISK CAM), TENSION	
108	4-908-513-01	SHAFT, FULCRUM, C ARM	
109	A-8042-510-A	MOTOR BLOCK ASSY, C	
110	*1-642-917-12	PC BOARD, IN SW	
111	3-669-607-41	+PSW (SMALL ROUND) (2.6X10)	
112	*1-642-913-12	PC BOARD, LD-MTR	
113	3-682-057-21	SPACER (SMALL)	
114	4-625-266-01	RETAINER, TRAY LEAF SPRING	
115	7-682-947-01	SCREW +PSW 3X6	
116	4-623-154-01	BELT, LOADING	
117	3-696-510-01	WASHER (3), STOPPER	
118	4-908-519-01	PULLEY (A)	

Ref. No.	Part No.	Description	Remark
119	4-912-528-01	GEAR, CAM	
120	4-623-699-01	SCREW (3X5)	
121	4-912-525-01	GEAR (B)	
122	4-912-514-01	GEAR (A)	
123	7-624-109-04	STOP RING 5.0, TYPE -E	
124	3-669-607-11	+PSW (SMALL ROUND) (2.6)	
125	*4-623-304-01	BRACKET, RELAY PC BOARD	
126	3-669-607-01	+PSW (SMALL ROUND) 2.6	
127	4-624-133-01	SPRING, LEAF, TRAY	
128	A-8042-509-A	MOTOR BLOCK ASSY, L	
129	7-621-258-05	SCREW +P 2.3X16	
130	*1-642-916-12	PC BOARD, L/C SW	
131	3-669-595-00	WASHER (2), STOPPER	
132	7-621-775-80	SCREW +B 2.6X16	
133	4-908-559-01	SPRING, COMPRESSION	
134	4-887-175-00	RUBBER, STOPPER	
135	X-4908-513-1	PLATE ASSY, ADJUSTMENT, ARM	
136	4-908-555-01	SPRING, TENSION (C ARM)	

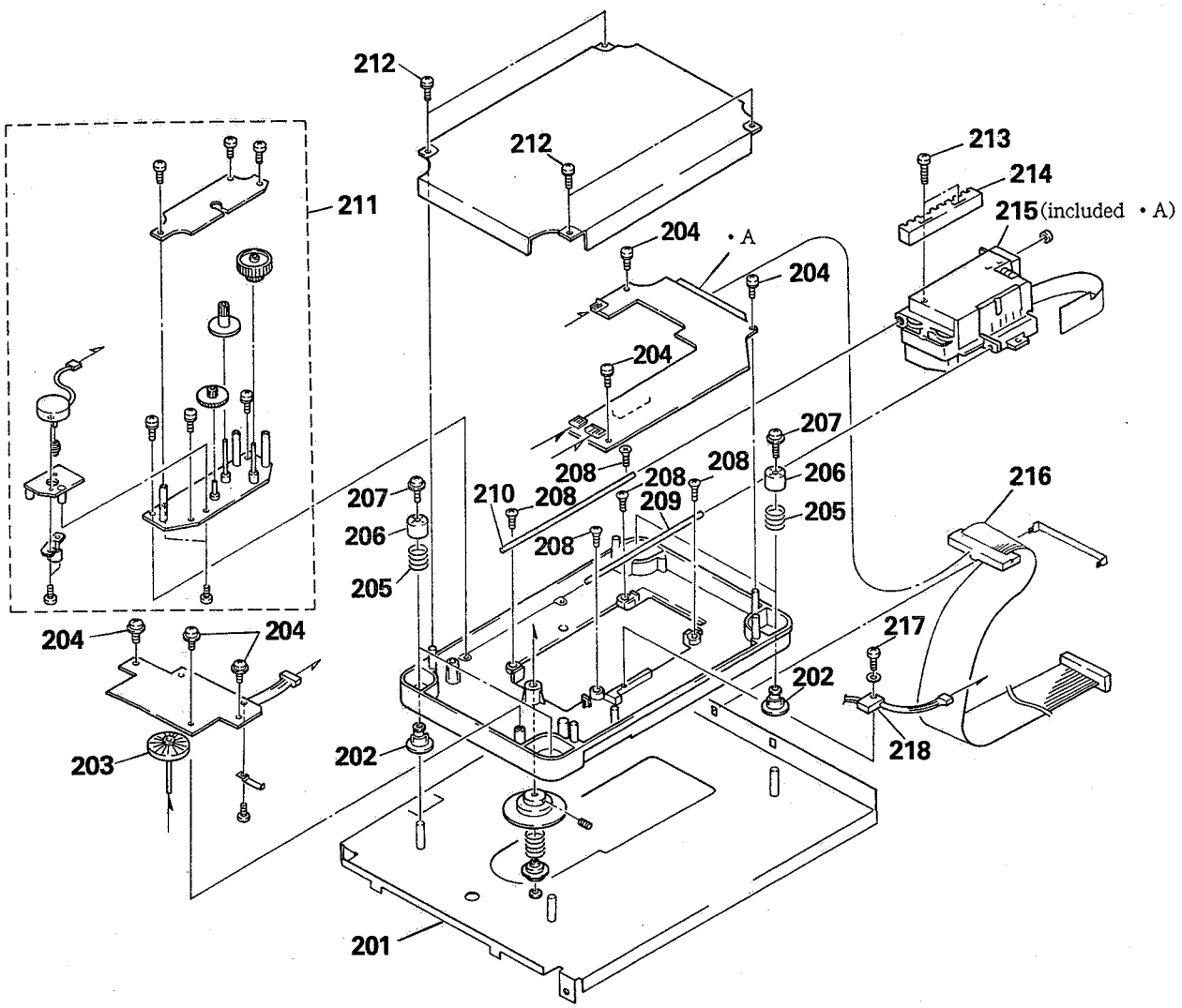
(4)



Ref. No.	Part No.	Description	Remark
151	7-685-871-01	SCREW +BVTT 3X6 (S)	
152	*1-642-918-12	PC BOARD, OUT SW	
153	3-669-607-41	+PSW (SMALL ROUND) (2.6X10)	
154	*X-4620-356-1	DECK ASSY, RETURN PULLEY	
155	4-908-524-01	PULLEY (B)	
156	3-696-510-01	WASHER (3), STOPPER	
157	*X-4620-352-1	PLATE ASSY, FIXED, TABLE	
158	4-623-699-01	SCREW (3X5)	
159	7-685-647-79	SCREW +BVTP 3X10 TYPE2	
160	*X-4912-505-1	BRACKET (RIGHT) ASSY, TABLE	
161	3-701-439-11	WASHER	
162	4-887-175-00	RUBBER, STOPPER	
163	*X-4912-514-1	SLIDER (CAM RIGHT) ASSY	
164	3-558-708-21	WASHER, STOPPER	
165	*X-4912-504-1	BRACKET (LEFT) ASSY, TABLE	
166	*4-912-583-01	SLIDER (CAM LEFT)	
167	*4-623-156-01	PLATE (LEFT), GROUND, TRAY	
168	*4-623-152-01	HOLDER, GUIDE BEARING	
169	4-623-157-01	SCREW, CABINET	
170	A-8019-078-A	BRACKET (L) BLOCK ASSY, TABLE	

Ref. No.	Part No.	Description	Remark
171	X-4941-167-2	PLATE ASSY, DISK	
172	*4-623-161-01	BRACKET, TRAY ORNAMENTAL	
173	7-685-861-01	SCREW +BVTT 2.6X5 (S)	
174	*4-912-544-01	PLATE, FIXED	
175	4-912-585-21	TABLE, DISK	
176	4-623-171-01	SHAFT (CDR), GUIDE	
177	*4-623-151-01	BEARING, SUB GUIDE	
178	4-623-158-12	RETAINER, GUIDE SHAFT	
179	4-908-525-01	PULLEY (C)	
180	4-912-517-01	ROPE	
181	*X-4620-355-1	RETAINER ASSY, GUIDE SHAFT	
182	*4-912-587-01	CUSHION	
183	4-912-538-01	BEARING (RIGHT), GUIDE	
184	4-912-593-01	WASHER	
185	*4-623-155-01	GUIDE, TABLE ASSIST	
186	*4-623-160-01	BRACKET, ROPE	
187	7-685-532-19	SCREW +BTP 2.6X5 TYPE2 N-S	
188	4-908-553-01	SPRING, COMPRESSION (ROPE)	
189	*4-912-568-01	PLATE (A), GROUND	

(5)



Note:	Note:
The components identified by mark ⚠ or dotted line with mark ⚠ are critical for safety. Replace only with part number specified.	Les composants identifiés par une marque ⚠ sont critiques pour la sécurité. Ne les remplacer que par une pièce portant le numéro spécifié.

Ref. No.	Part No.	Description	Remark
201	*X-4620-361-1	CHASSIS ASSY, FITTING, BU	
202	4-921-816-01	INSULATOR	
203	8-835-486-01	MOTOR, DC SSC-01E02S	
204	2-625-741-01	SCREW (M3X6), +PSW	
205	4-908-594-01	SPRING, COMPRESSION	
206	4-912-578-01	HOLDER, SP	
207	7-682-949-01	SCREW +PSW 3X10	
208	7-682-248-04	SCREW +K 3X8	
209	*2-645-414-01	SHAFT (B), GUIDE	
210	*2-645-212-01	SHAFT (A), GUIDE	
211	X-2625-342-3	BOX ASSY (2), GEAR	
212	2-626-076-01	SCREW (M3X4)	
213	3-719-381-61	SCREW M2X9	
214	A-4910-439-B	RACK ASSY (Y-4)	
215	⚠8-848-255-11	DEVICE, OPTICAL KRM-131A (RP)	
216	1-690-839-11	CORD, CONNECTION (BU) 34P	
217	3-719-381-21	SCREW M2X6	
218	X-2625-025-1	SWITCH ASSY, LIMIT	

SECTION 11
ELECTRICAL PARTS LIST

NOTE:

- Due to standardization, replacements in the parts list may be different from the parts specified in the diagrams or the components used on the set.
- Items marked "*" are not stocked since they are seldom required for routine service. Some delay should be anticipated when ordering these items.
- If there are two or more same circuits in a set such as a stereophonic machine, only typical circuit parts may be indicated and capacitors and resistors in other same circuits may be omitted.

CAPACITORS :
MF : μF, PF : μμF.

RESISTORS
- All resistors are in ohms.
- F : nonflammable

COILS
- MMH : mH, UH : μH.

SEMICONDUCTORS
In each case, U : μ, for example :
UA... : μA... , UPA... : μPA... ,
UPC... : μPC... , UPD... : μPD... ,

The components identified by mark ⚠ or dotted line with mark ⚠ are critical for safety.
Replace only with part number specified.

Les composants identifiés par une marque ⚠ sont critiques pour la sécurité.
Ne les remplacer que par une pièce portant le numéro spécifié.

Ref. No.	Part No.	Description			
		MOUNTED PCB, AC ★★★★★★★★			
	*1-643-623-11	PC BOARD, AC-1			
		CAPACITOR			
C920	1-162-599-12	CERAMIC	0.0047MF	20%	400V
		LINE FILTER			
L920	1-424-291-11	FILTER, LINE			
★★★★★★★★

Ref.No.	Part No.	Description			
C313	1-163-131-00	CERAMIC CHIP	390PF	5%	50V
C315	1-163-809-11	CERAMIC CHIP	0.047MF	10%	25V
C317	1-164-004-11	CERAMIC CHIP	0.1MF	10%	25V
C322	1-135-083-11	TANTAL. CHIP	0.47MF	10%	25V
C323	1-164-232-11	CERAMIC CHIP	0.01MF	10%	100V
C324	1-164-004-11	CERAMIC CHIP	0.1MF	10%	25V
C325	1-164-004-11	CERAMIC CHIP	0.1MF	10%	25V
C326	1-135-155-21	TANTAL. CHIP	4.7MF	10%	16V
C327	1-163-989-11	CERAMIC CHIP	0.033MF	10%	25V
C328	1-135-179-21	TANTAL. CHIP	2.2MF	10%	16V
C329	1-163-023-00	CERAMIC CHIP	0.015MF	10%	50V
C330	1-164-004-11	CERAMIC CHIP	0.1MF	10%	25V
C331	1-135-179-21	TANTAL. CHIP	2.2MF	10%	16V
C332	1-163-989-11	CERAMIC CHIP	0.033MF	10%	25V
C333	1-164-232-11	CERAMIC CHIP	0.01MF	10%	100V
C334	1-163-989-11	CERAMIC CHIP	0.033MF	10%	25V
C335	1-163-037-11	CERAMIC CHIP	0.022MF	10%	25V
C336	1-164-004-11	CERAMIC CHIP	0.1MF	10%	25V
C337	1-163-809-11	CERAMIC CHIP	0.047MF	10%	25V
C338	1-164-004-11	CERAMIC CHIP	0.1MF	10%	25V
C339	1-164-004-11	CERAMIC CHIP	0.1MF	10%	25V
C340	1-164-004-11	CERAMIC CHIP	0.1MF	10%	25V
C341	1-164-004-11	CERAMIC CHIP	0.1MF	10%	25V
C342	1-164-004-11	CERAMIC CHIP	0.1MF	10%	25V
C343	1-164-004-11	CERAMIC CHIP	0.1MF	10%	25V
C344	1-164-004-11	CERAMIC CHIP	0.1MF	10%	25V
C345	1-164-004-11	CERAMIC CHIP	0.1MF	10%	25V
C346	1-164-004-11	CERAMIC CHIP	0.1MF	10%	25V
C347	1-164-004-11	CERAMIC CHIP	0.1MF	10%	25V
C348	1-164-004-11	CERAMIC CHIP	0.1MF	10%	25V
C349	1-164-004-11	CERAMIC CHIP	0.1MF	10%	25V
C350	1-164-004-11	CERAMIC CHIP	0.1MF	10%	25V
C351	1-164-004-11	CERAMIC CHIP	0.1MF	10%	25V
C352	1-135-212-21	TANTAL. CHIP	2.2MF	10%	35V
C353	1-163-143-00	CERAMIC CHIP	0.0012MF	5%	50V
C354	1-135-166-21	TANTAL. CHIP	47MF	10%	10V
C355	1-164-004-11	CERAMIC CHIP	0.1MF	10%	25V
C356	1-163-131-00	CERAMIC CHIP	390PF	5%	50V
C380	1-163-809-11	CERAMIC CHIP	0.047MF	10%	25V
C381	1-164-232-11	CERAMIC CHIP	0.01MF	10%	100V
C382	1-163-117-00	CERAMIC CHIP	100PF	5%	50V
C383	1-164-004-11	CERAMIC CHIP	0.1MF	10%	25V
C384	1-164-004-11	CERAMIC CHIP	0.1MF	10%	25V
C385	1-164-004-11	CERAMIC CHIP	0.1MF	10%	25V
C386	1-164-004-11	CERAMIC CHIP	0.1MF	10%	25V
C387	1-164-004-11	CERAMIC CHIP	0.1MF	10%	25V
C390	1-163-117-00	CERAMIC CHIP	100PF	5%	50V
C391	1-163-101-00	CERAMIC CHIP	22PF	5%	50V
C392	1-163-101-00	CERAMIC CHIP	22PF	5%	50V
C393	1-164-004-11	CERAMIC CHIP	0.1MF	10%	25V
C402	1-163-141-00	CERAMIC CHIP	0.001MF	5%	50V
C403	1-135-161-21	TANTAL. CHIP	22MF	10%	6.3V
C404	1-135-161-21	TANTAL. CHIP	22MF	10%	6.3V
C405	1-163-017-00	CERAMIC CHIP	0.0047MF	10%	50V
C406	1-164-695-11	CERAMIC CHIP	0.0022MF	5%	50V
C407	1-163-103-00	CERAMIC CHIP	27PF	5%	50V
C408	1-163-809-11	CERAMIC CHIP	0.047MF	10%	25V
C409	1-164-232-11	CERAMIC CHIP	0.01MF	10%	100V
C410	1-164-344-11	CERAMICCHIP	0.068MF	10%	25V
C411	1-163-129-00	CERAMIC CHIP	330PF	5%	50V
C412	1-135-101-	TANTAL. CHIP	22MF	10%	6.3V
C413	1-164-004-11	CERAMIC CHIP	0.1MF	10%	25V
C414	1-164-004-11	CERAMIC CHIP	0.1MF	10%	25V
C415	1-164-004-11	CERAMIC CHIP	0.1MF	10%	25V
C416	1-164-004-11	CERAMIC CHIP	0.1MF	10%	25V
C417	1-164-004-11	CERAMIC CHIP	0.1MF	10%	25V
C418	1-164-004-11	CERAMIC CHIP	0.1MF	10%	25V
C419	1-164-004-11	CERAMIC CHIP	0.1MF	10%	25V
C420	1-135-212-21	TANTAL. CHIP	2.2MF	10%	35V
C421	1-164-004-11	CERAMIC CHIP	0.1MF	10%	25V
C422	1-164-343-11	CERAMIC CHIP	0.056MF	10%	25V
C423	1-164-343-11	CERAMIC CHIP	0.056MF	10%	25V
C424	1-163-986-00	CERAMIC CHIP	0.027MF	10%	25V
C425	1-163-131-00	CERAMIC CHIP	390PF	5%	50V
C427	1-163-037-11	CERAMIC CHIP	0.022MF	10%	25V
C428	1-164-004-11	CERAMIC CHIP	0.1MF	10%	25V
C429	1-164-004-11	CERAMIC CHIP	0.1MF	10%	25V
C430	1-164-004-11	CERAMIC CHIP	0.1MF	10%	25V
C432	1-164-004-11	CERAMIC CHIP	0.1MF	10%	25V
C433	1-164-004-11	CERAMIC CHIP	0.1MF	10%	25V
C434	1-163-141-00	CERAMIC CHIP	0.001MF	5%	50V
C435	1-164-695-11	CERAMIC CHIP	0.0022MF	5%	50V
C436	1-164-004-11	CERAMIC CHIP	0.1MF	10%	25V
C437	1-164-004-11	CERAMIC CHIP	0.1MF	10%	25V
C438	1-135-212-21	TANTAL. CHIP	2.2MF	10%	20V
C439	1-164-004-11	CERAMIC CHIP	0.1MF	10%	25V
C440	1-163-809-11	CERAMIC CHIP	0.047MF	10%	25V
C441	1-163-986-00	CERAMIC CHIP	0.027MF	10%	25V
C442	1-164-345-11	CERAMIC CHIP	0.082MF	10%	25V
C443	1-164-004-11	CERAMIC CHIP	0.1MF	10%	25V
C444	1-135-164-21	TANTAL. CHIP	22MF	10%	20V
C445	1-164-489-11	CERAMIC CHIP	0.22MF	10%	16V
C446	1-163-145-00	CERAMIC CHIP	0.0015MF	5%	50V
C447	1-164-004-11	CERAMIC CHIP	0.1MF	10%	25V
C448	1-135-164-21	TANTAL. CHIP	22MF	10%	20V
C450	1-164-004-11	CERAMIC CHIP	0.1MF	10%	25V
C451	1-164-489-11	CERAMIC CHIP	0.22MF	10%	16V
C452	1-164-489-11	CERAMIC CHIP	0.22MF	10%	16V
C455	1-135-164-21	TANTAL.CHIP	22MF	10%	20V
C456	1-135-164-21	TANTAL.CHIP	22MF	10%	20V
C460	1-135-201-11	TANTAL. CHIP	10MF	10%	4V
C461	1-135-201-11	TANTAL. CHIP	10MF	10%	4V
C462	1-164-489-11	CERAMIC CHIP	0.22MF	10%	16V
C463	1-164-489-11	CERAMIC CHIP	0.22MF	10%	16V
C464	1-164-489-11	CERAMIC CHIP	0.22MF	10%	16V
C470	1-135-179-21	TANTAL. CHIP	2.2MF	10%	16V
C471	1-135-179-21	TANTAL. CHIP	2.2MF	10%	16V
C501	1-164-004-11	CERAMIC CHIP	0.1MF	10%	25V
C502	1-164-004-11	CERAMIC CHIP	0.1MF	10%	25V
C503	1-163-101-00	CERAMIC CHIP	22PF	5%	50V
C504	1-163-037-11	CERAMIC CHIP	0.022MF	10%	25V
C505	1-164-004-11	CERAMIC CHIP	0.1MF	10%	25V
C506	1-164-004-11	CERAMIC CHIP	0.1MF	10%	25V
C507	1-164-004-11	CERAMIC CHIP	0.1MF	10%	25V
C508	1-164-004-11	CERAMIC CHIP	0.1MF	10%	25V
C509	1-163-141-00	CERAMIC CHIP	0.001MF	5%	50V
C510	1-164-004-11	CERAMIC CHIP	0.1MF	10%	25V
C511	1-164-004-11	CERAMIC CHIP	0.1MF	10%	25V
C512	1-164-004-11	CERAMIC CHIP	0.1MF	10%	25V
C513	1-164-004-11	CERAMIC CHIP	0.1MF	10%	25V
C514	1-164-004-11	CERAMIC CHIP	0.1MF	10%	25V
C516	1-164-004-11	CERAMIC CHIP	0.1MF	10%	25V
C517	1-164-004-11	CERAMIC CHIP	0.1MF	10%	25V
C520	1-135-155-21	TANTAL. CHIP	4.7MF	10%	16V
C521	1-164-004-11	CERAMIC CHIP	0.1MF	10%	25V
C522	1-164-004-11	CERAMIC CHIP	0.1MF	10%	25V
C523	1-164-004-11	CERAMIC CHIP	0.1MF	10%	25V
C524	1-164-004-11	CERAMIC CHIP	0.1MF	10%	25V
C525	1-164-004-11	CERAMIC CHIP	0.1MF	10%	25V
C526	1-164-004-11	CERAMIC CHIP	0.1MF	10%	25V
C527	1-164-004-11	CERAMIC CHIP	0.1MF	10%	25V
C528	1-164-004-11	CERAMIC CHIP	0.1MF	10%	25V
C529	1-163-141-00	CERAMIC CHIP	0.001MF	5%	50V
C530	1-163-133-00	CERAMIC CHIP	470PF	5%	50V
C531	1-163-093-00	CERAMIC CHIP	10PF	5%	50V
C532	1-163-093-00	CERAMIC CHIP	10PF	5%	50V
C533	1-135-155-21	TANTAL. CHIP	4.7MF	10%	16V
C534	1-135-091-00	TANTAL. CHIP	1MF	10%	16V
C540	1-164-489-11	CERAMIC CHIP	0.22MF	10%	16V
C546	1-163-133-00	CERAMIC CHIP	470PF	5%	50V

WRITER

Ref.No.	Part No.	Description			
C550	1-164-004-11	CERAMIC CHIP	0.1MF	10%	25V
C560	1-163-986-00	CERAMIC CHIP	0.027MF	10%	25V
C561	1-135-155-21	TANTAL. CHIP	4.7MF	10%	16V
C701	1-163-109-00	CERAMIC CHIP	47PF	5%	50V
C702	1-163-109-00	CERAMIC CHIP	47PF	5%	50V
C703	1-163-109-00	CERAMIC CHIP	47PF	5%	50V
C704	1-164-005-11	CERAMIC CHIP	0.47MF		25V
C705	1-164-004-11	CERAMIC CHIP	0.1MF	10%	25V
C706	1-164-004-11	CERAMIC CHIP	0.1MF	10%	25V
C707	1-164-004-11	CERAMIC CHIP	0.1MF	10%	25V
C708	1-164-004-11	CERAMIC CHIP	0.1MF	10%	25V
C709	1-164-004-11	CERAMIC CHIP	0.1MF	10%	25V
C710	1-164-004-11	CERAMIC CHIP	0.1MF	10%	25V
C711	1-164-004-11	CERAMIC CHIP	0.1MF	10%	25V
C712	1-164-004-11	CERAMIC CHIP	0.1MF	10%	25V
C713	1-164-004-11	CERAMIC CHIP	0.1MF	10%	25V
C714	1-164-004-11	CERAMIC CHIP	0.1MF	10%	25V
C715	1-164-004-11	CERAMIC CHIP	0.1MF	10%	25V
C716	1-164-004-11	CERAMIC CHIP	0.1MF	10%	25V
C717	1-164-004-11	CERAMIC CHIP	0.1MF	10%	25V
C718	1-164-004-11	CERAMIC CHIP	0.1MF	10%	25V
C719	1-164-004-11	CERAMIC CHIP	0.1MF	10%	25V
C720	1-164-004-11	CERAMIC CHIP	0.1MF	10%	25V
C721	1-164-004-11	CERAMIC CHIP	0.1MF	10%	25V
C722	1-164-004-11	CERAMIC CHIP	0.1MF	10%	25V
C723	1-164-004-11	CERAMIC CHIP	0.1MF	10%	25V
C724	1-164-004-11	CERAMIC CHIP	0.1MF	10%	25V
C725	1-164-004-11	CERAMIC CHIP	0.1MF	10%	25V
C726	1-164-004-11	CERAMIC CHIP	0.1MF	10%	25V
C727	1-164-004-11	CERAMIC CHIP	0.1MF	10%	25V
C728	1-164-004-11	CERAMIC CHIP	0.1MF	10%	25V
C729	1-164-004-11	CERAMIC CHIP	0.1MF	10%	25V
C730	1-164-004-11	CERAMIC CHIP	0.1MF	10%	25V
C731	1-164-004-11	CERAMIC CHIP	0.1MF	10%	25V
C732	1-164-004-11	CERAMIC CHIP	0.1MF	10%	25V
C733	1-164-004-11	CERAMIC CHIP	0.1MF	10%	25V
C734	1-164-004-11	CERAMIC CHIP	0.1MF	10%	25V
C735	1-164-004-11	CERAMIC CHIP	0.1MF	10%	25V
C736	1-164-004-11	CERAMIC CHIP	0.1MF	10%	25V
C737	1-164-004-11	CERAMIC CHIP	0.1MF	10%	25V
C740	1-163-100-00	CERAMIC CHIP	20PF	5%	50V
C741	1-163-100-00	CERAMIC CHIP	20PF	5%	50V
C742	1-164-004-11	CERAMIC CHIP	0.1MF	10%	25V
C743	1-126-200-11	ELECT CHIP	10MF	20%	35V
C780	1-126-204-11	ELECT CHIP	47MF	20%	16V
C781	1-126-204-11	ELECT CHIP	47MF	20%	16V
C782	1-126-204-11	ELECT CHIP	47MF	20%	16V
C783	1-126-204-11	ELECT CHIP	47MF	20%	16V
C784	1-126-204-11	ELECT CHIP	47MF	20%	16V
C785	1-126-204-11	ELECT CHIP	47MF	20%	16V
C786	1-126-204-11	ELECT CHIP	47MF	20%	16V
C787	1-126-204-11	ELECT CHIP	47MF	20%	16V
C788	1-126-204-11	ELECT CHIP	47MF	20%	16V

CONNECTOR

CNJ101	*1-565-429-11	HEADER, CONNECTOR 34P
CNJ401	*1-506-473-11	PIN, CONNECTOR 8P
CNJ501	1-566-311-11	HEADER, CONNECTOR 10P
CNJ502	*1-568-063-11	HEADER, CONNECTOR 16P
CNJ701	*1-564-915-11	PIN, CONNECTOR 7P
CNJ702	*1-564-508-11	PLUG, CONNECTOR 5P
CNJ703	*1-564-505-11	PLUG, CONNECTOR 2P
CNJ704	*1-564-505-11	PLUG, CONNECTOR 2P
CNJ705	1-506-470-11	PIN, CONNECTOR 5P
CNJ706	*1-565-429-11	HEADER, CONNECTOR 34P
CNJ707	*1-506-477-11	PIN, CONNECTOR 12P
CNJ708	1-506-472-11	PIN, CONNECTOR 7P
CNJ709	*1-506-467-11	PIN, CONNECTOR 2P
CNJ711	1-566-471-11	HEADER, CONNECTOR 64P
CNJ712	1-566-471-11	HEADER, CONNECTOR 64P
CNJ713	*1-506-471-11	PIN, CONNECTOR 6P

DIODE

D101	8-719-105-32	DIODE	RD2.7M-B2
D105	8-719-948-47	DIODE	HSM88AS
D106	8-719-948-47	DIODE	HSM88AS
D109	8-719-948-47	DIODE	HSM88AS
D110	8-719-948-47	DIODE	HSM88AS
D111	8-719-948-47	DIODE	HSM88AS
D112	8-719-948-47	DIODE	HSM88AS
D113	8-719-948-47	DIODE	HSM88AS
D114	8-719-948-47	DIODE	HSM88AS
D115	8-719-948-47	DIODE	HSM88AS
D116	8-719-400-18	DIODE	MA152WK
D117	8-719-400-18	DIODE	MA152WK
D120	8-719-948-47	DIODE	HSM88AS
D301	8-719-400-18	DIODE	MA152WK
D302	8-719-400-18	DIODE	MA152WK
D401	8-719-400-18	DIODE	MA152WK
D402	8-719-400-18	DIODE	MA152WK
D403	8-719-400-18	DIODE	MA152WK
D404	8-719-400-18	DIODE	MA152WK
D502	8-719-400-18	DIODE	MA152WK
D503	8-719-400-18	DIODE	MA152WK
D504	8-719-400-18	DIODE	MA152WK
D505	8-719-927-77	DIODE	KV1230Z
D506	8-719-927-77	DIODE	KV1230Z
D507	8-719-106-43	DIODE	RD9.1M-B1
D721	8-719-210-39	DIODE	EC10QS-04
D722	8-719-400-18	DIODE	MA152WK
D724	8-719-400-18	DIODE	MA152WK
D726	8-719-210-39	DIODE	EC10QS-04
D730	8-719-940-16	DIODE	GL1PR51
D731	8-719-940-16	DIODE	GL1PR51
D732	8-719-940-16	DIODE	GL1PR51
D733	8-719-940-16	DIODE	GL1PR51
D734	8-719-940-16	DIODE	GL1PR51
D780	8-719-400-18	DIODE	MA152WK
DB721	8-719-980-36	DIODE	DAP803
DB722	8-719-980-36	DIODE	DAP803

IC

IC101	8-759-984-88	IC	LM6361M
IC102	8-759-984-88	IC	LM6361M
IC103	8-759-700-78	IC	NJM082M
IC104	8-759-037-49	IC	MC34084DW
IC105	8-759-981-75	IC	RC3403AM
IC107	8-759-981-61	IC	LM2901M
IC108	8-759-013-96	IC	MC74HC4316F
IC109	8-759-701-39	IC	NJM3404AM
IC110	8-759-037-49	IC	MC34084DW
IC111	8-759-037-49	IC	MC34084DW
IC112	8-759-061-16	IC	SD5400CY
IC113	8-759-037-49	IC	MC34084DW
IC114	8-759-923-63	IC	TL592PS
IC115	8-759-923-63	IC	TL592PS
IC116	8-759-300-71	IC	MC14053BF
IC117	8-759-952-07	IC	SN752078N
IC118	8-759-925-74	IC	SN74HC04ANS
IC119	8-759-701-39	IC	NJM3404AM
IC120	8-759-984-88	IC	LM6361M
IC302	8-759-058-27	IC	DS1267S-10
IC303	8-759-981-75	IC	RC3403AM
IC304	8-759-981-75	IC	RC3403AM
IC305	8-759-037-49	IC	MC34084DW
IC306	8-759-981-65	IC	LM2903M
IC307	8-759-013-96	IC	MC74HC4316F
IC308	8-759-013-96	IC	MC74HC4316F
IC310	8-752-053-73	IC	CXA1372AQ

Ref. No.	Part No.		Description
IC311	8-759-981-78	IC	RC3404AM
IC312	8-759-058-17	IC	LA6501
IC313	8-759-058-17	IC	LA6501
IC314	8-759-058-17	IC	LA6501
IC315	8-759-058-17	IC	LA6501
IC316	8-759-058-17	IC	LA6501
IC317	8-759-058-17	IC	LA6501
IC318	8-759-925-74	IC	SN74HC04ANS
IC319	8-759-700-78	IC	NJM082M
IC320	8-759-300-71	IC	HD14053BFP
IC330	8-759-927-46	IC	SN74HC00ANS
IC401	8-752-053-44	IC	CXA1380M
IC402	8-759-926-74	IC	SN74HC393ANS
IC403	8-759-926-23	IC	SN74HC163ANS
IC404	8-759-250-81	IC	TC5081AP
IC405	8-759-300-71	IC	HD14053BFP
IC406	8-759-201-29	IC	TC9122P
IC407	8-759-984-30	IC	BA6321
IC408	8-759-013-96	IC	MC74HC4316F
IC409	8-759-013-96	IC	MC74HC4316F
IC410	8-759-925-80	IC	SN74HC14ANS
IC411	8-759-981-75	IC	RC3403AM
IC412	8-759-981-75	IC	RC3403AM
IC413	8-759-981-75	IC	RC3403AM
IC414	8-752-336-78	IC	CXD2520Q
IC415	8-752-337-26	IC	CXD2500AQ
IC416	8-759-058-17	IC	LA6501-FA-TL
IC501	8-759-927-46	IC	SN74HC00ANS
IC502	8-759-206-28	IC	TC74HC123F
IC504	8-759-094-79	IC	PEEL18CV8S-W504F3
IC505	8-759-925-74	IC	SN74HC04ANS
IC506	8-759-926-24	IC	SN74HC164NS
IC507	8-759-926-24	IC	SN74HC164NS
IC508	8-759-926-24	IC	SN74HC164NS
IC509	8-759-061-21	IC	PEEL18CV8-W509F
IC510	8-759-061-24	IC	PEEL22CV10-W510F
IC512	8-759-301-24	IC	HD10124
IC513	8-759-925-90	IC	SN74HC74ANS
IC514	8-759-926-23	IC	SN74HC163ANS
IC515	8-759-926-23	IC	SN74HC163ANS
IC516	8-759-038-11	IC	MC74HC4046AN
IC517	8-759-926-23	IC	SN74HC163ANS
IC518	8-759-926-23	IC	SN74HC163ANS
IC519	8-759-982-21	IC	RC78L05A
IC520	8-759-701-39	IC	NJM3404AM
IC521	8-759-927-29	IC	SN74HCU04ANS
IC525	8-759-927-29	IC	SN74HCU04ANS
IC526	8-759-982-21	IC	RC78L05A
IC701	8-759-242-61	IC	TMP68301F-12
IC702	8-759-164-38	IC	AM27C1024-WTR1.12
IC703	8-759-060-95	IC	PEEL18CV8SC-W703
IC704	8-752-337-78	IC	CXK58257AM-10L
IC705	8-752-337-78	IC	CXK58257AM-10L
IC706	8-759-979-38	IC	AK93C46F
IC707	8-759-925-90	IC	SN74HC74ANS
IC708	8-759-605-21	IC	M51953AFP
IC709	8-759-058-35	IC	LT1181CS-TE1
IC710	8-759-925-85	IC	SN74HC32ANS
IC721	8-759-058-20	IC	M66500FP
IC722	8-759-058-20	IC	M66500FP
IC723	8-759-058-23	IC	MX7828LCWI
IC724	8-759-058-31	IC	MX7528KCWP
IC725	8-759-231-92	IC	TA7291P
IC726	8-759-925-74	IC	SN74HC04ANS
IC727	8-759-926-49	IC	SN74HC245ANS
IC728	8-759-094-78	IC	PEEL22CV10-W728C
IC729	8-759-057-91	IC	PEEL18CV8PC-W1D5
IC730	8-759-923-64	IC	AM26LS32ACNS
IC740	8-759-929-26	IC	TL431CPS
IC741	8-759-981-75	IC	RC3403AM

Ref. No.	Part No.	Description
		DELAY LINE
IC503	1-415-121-00	DELAY LINE
IC511	1-415-167-00	DELAY LINE
		IC SOCKET
ICS509	#1-526-656-00	SOCKET, IC (DP) 20P
ICS510	#1-526-816-21	SOCKET, IC (DP) 24P
ICS702	#1-526-662-21	SOCKET, IC (DP) 40P
ICS728	#1-526-816-21	SOCKET, IC (DP) 24P
ICS729	#1-526-656-00	SOCKET, IC (DP) 20P
		FILTER
L701	#1-235-096-00	FILTER, LOW PASS
L702	#1-235-096-00	FILTER, LOW PASS
L703	#1-235-096-00	FILTER, LOW PASS
L704	#1-235-096-00	FILTER, LOW PASS
		TRANSISTOR
Q101	8-729-101-07	TRANSISTOR 2SB798-DL
Q102	8-729-103-07	TRANSISTOR 2SB798-DL
Q103	8-729-113-13	TRANSISTOR FA1A4M-L33
Q105	8-729-113-13	TRANSISTOR FA1A4M-L33
Q106	8-729-113-13	TRANSISTOR FA1A4M-L33
Q107	8-729-113-13	TRANSISTOR FA1A4M-L33
Q303	8-729-113-13	TRANSISTOR FA1A4M-L33
Q310	8-729-113-13	TRANSISTOR FA1A4M-L33
Q401	8-729-805-65	TRANSISTOR 2SA1344
Q402	8-729-805-65	TRANSISTOR 2SA1344
Q403	8-729-113-13	TRANSISTOR FA1A4M-L33
Q404	8-729-140-31	TRANSISTOR 2SA1461-Y23
Q405	8-729-140-31	TRANSISTOR 2SA1461-Y23
Q406	8-729-113-13	TRANSISTOR FA1A4M-L33
Q407	8-729-805-65	TRANSISTOR 2SA1344
Q408	8-729-805-65	TRANSISTOR 2SA1344
Q409	8-729-113-26	TRANSISTOR FA1L3Z-L37
Q501	8-729-140-75	TRANSISTOR 2SD999-CLCK
Q721	8-729-113-13	TRANSISTOR FA1A4M-L33
Q722	8-729-113-13	TRANSISTOR FA1A4M-L33
Q723	8-729-805-65	TRANSISTOR 2SA1344
Q724	8-729-805-65	TRANSISTOR 2SA1344
Q725	8-729-805-65	TRANSISTOR 2SA1344
Q726	8-729-805-65	TRANSISTOR 2SA1344
Q727	8-729-140-75	TRANSISTOR 2SD999-CLCK
Q728	8-729-113-13	TRANSISTOR FA1A4M-L33
Q729	8-729-140-31	TRANSISTOR 2SA1461-Y23
Q730	8-729-205-32	TRANSISTOR 2SB553-Y
		RESISTOR
R101	1-216-073-00	METAL GLAZE 10K 5% 1/10W
R102	1-216-025-00	METAL GLAZE 100 5% 1/10W
R105	1-216-659-11	METAL CHIP 2.2K 0.50% 1/10W
R106	1-216-676-11	METAL CHIP 11K 0.50% 1/10W
R107	1-216-683-11	METAL CHIP 22K 0.50% 1/10W
R108	1-216-698-11	METAL CHIP 91K 0.50% 1/10W
R109	1-216-073-00	METAL GLAZE 10K 5% 1/10W
R110	1-216-105-00	METAL GLAZE 220K 5% 1/10W
R112	1-216-065-00	METAL GLAZE 4.7K 5% 1/10W
R113	1-216-065-00	METAL GLAZE 4.7K 5% 1/10W
R114	1-216-081-00	METAL GLAZE 22K 5% 1/10W
R115	1-216-089-00	METAL GLAZE 47K 5% 1/10W
R116	1-216-065-00	METAL GLAZE 4.7K 5% 1/10W
R117	1-216-081-00	METAL GLAZE 22K 5% 1/10W
R118	1-216-081-00	METAL GLAZE 22K 5% 1/10W
R122	1-216-097-00	METAL GLAZE 100K 5% 1/10W
R123	1-216-109-00	METAL GLAZE 330K 5% 1/10W
R125	1-216-093-00	METAL GLAZE 68K 5% 1/10W
R126	1-216-077-00	METAL GLAZE 15K 5% 1/10W
R128	1-216-687-11	METAL CHIP 33K 0.50% 1/10W
R129	1-216-689-11	METAL CHIP 39K 0.50% 1/10W
R130	1-218-754-11	METAL CHIP 120K 0.50% 1/10W

WRITER

Ref. No.	Part No.	Description			
R131	1-216-065-00	METAL GLAZE	4.7K	5%	1/10W
R134	1-216-073-00	METAL GLAZE	10K	5%	1/10W
R139	1-216-057-00	METAL GLAZE	2.2K	5%	1/10W
R140	1-216-061-00	METAL GLAZE	3.3K	5%	1/10W
R141	1-216-017-00	METAL GLAZE	47	5%	1/10W
R142	1-216-121-00	METAL GLAZE	1M	5%	1/10W
R143	1-216-085-00	METAL GLAZE	33K	5%	1/10W
R144	1-216-081-00	METAL GLAZE	22K	5%	1/10W
R145	1-216-081-00	METAL GLAZE	22K	5%	1/10W
R147	1-216-081-00	METAL GLAZE	22K	5%	1/10W
R148	1-216-081-00	METAL GLAZE	22K	5%	1/10W
R149	1-216-073-00	METAL GLAZE	10K	5%	1/10W
R151	1-216-059-00	METAL GLAZE	2.7K	5%	1/10W
R152	1-216-075-00	METAL GLAZE	12K	5%	1/10W
R153	1-216-073-00	METAL GLAZE	10K	5%	1/10W
R154	1-216-079-00	METAL GLAZE	18K	5%	1/10W
R155	1-216-073-00	METAL GLAZE	10K	5%	1/10W
R157	1-216-689-11	METAL GLAZE	39K	0.5%	1/10W
R158	1-216-070-00	METAL GLAZE	7.5K	5%	1/10W
R159	1-216-065-00	METAL GLAZE	4.7K	5%	1/10W
R160	1-216-105-00	METAL GLAZE	220K	5%	1/10W
R161	1-216-065-00	METAL GLAZE	4.7K	5%	1/10W
R162	1-216-075-00	METAL GLAZE	12K	5%	1/10W
R163	1-216-055-00	METAL GLAZE	1.8K	5%	1/10W
R164	1-216-017-00	METAL GLAZE	47	5%	1/10W
R165	1-216-017-00	METAL GLAZE	47	5%	1/10W
R166	1-216-121-00	METAL GLAZE	1M	5%	1/10W
R167	1-216-085-00	METAL GLAZE	33K	5%	1/10W
R168	1-216-656-11	METAL CHIP	1.6K	0.50%	1/10W
R169	1-216-629-11	METAL CHIP	120	0.50%	1/10W
R170	1-216-654-11	METAL CHIP	1.3K	0.50%	1/10W
R171	1-216-073-00	METAL GLAZE	10K	5%	1/10W
R172	1-216-121-00	METAL GLAZE	1M	5%	1/10W
R173	1-216-085-00	METAL GLAZE	33K	5%	1/10W
R175	1-216-121-00	METAL GLAZE	1M	5%	1/10W
R178	1-216-025-00	METAL GLAZE	100	5%	1/10W
R179	1-216-025-00	METAL GLAZE	100	5%	1/10W
R180	1-216-073-00	METAL GLAZE	10K	5%	1/10W
R181	1-216-097-00	METAL GLAZE	100K	5%	1/10W
R182	1-216-073-00	METAL GLAZE	10K	5%	1/10W
R183	1-216-097-00	METAL GLAZE	100K	5%	1/10W
R184	1-216-689-11	METAL GLAZE	39K	0.5%	1/10W
R185	1-216-089-00	METAL GLAZE	47K	5%	1/10W
R186	1-216-081-00	METAL GLAZE	22K	5%	1/10W
R187	1-216-121-00	METAL GLAZE	1M	5%	1/10W
R188	1-216-065-00	METAL GLAZE	4.7K	5%	1/10W
R190	1-216-085-00	METAL GLAZE	33K	5%	1/10W
R194	1-216-057-00	METAL GLAZE	2.2K	5%	1/10W
R195	1-216-071-00	METAL GLAZE	8.2K	5%	1/10W
R196	1-216-073-00	METAL GLAZE	10K	5%	1/10W
R197	1-216-081-00	METAL GLAZE	22K	5%	1/10W
R198	1-216-081-00	METAL GLAZE	22K	5%	1/10W
R199	1-216-057-00	METAL GLAZE	2.2K	5%	1/10W
R200	1-216-047-00	METAL GLAZE	820	5%	1/10W
R201	1-216-057-00	METAL GLAZE	2.2K	5%	1/10W
R203	1-216-081-00	METAL GLAZE	22K	5%	1/10W
R204	1-216-081-00	METAL GLAZE	22K	5%	1/10W
R205	1-216-057-00	METAL GLAZE	2.2K	5%	1/10W
R206	1-216-047-00	METAL GLAZE	820	5%	1/10W
R207	1-216-057-00	METAL GLAZE	2.2K	5%	1/10W
R209	1-216-089-00	METAL GLAZE	47K	5%	1/10W
R210	1-216-073-00	METAL GLAZE	10K	5%	1/10W
R211	1-216-065-00	METAL GLAZE	4.7K	5%	1/10W
R212	1-216-065-00	METAL GLAZE	4.7K	5%	1/10W
R213	1-216-065-00	METAL GLAZE	4.7K	5%	1/10W
R214	1-216-065-00	METAL GLAZE	4.7K	5%	1/10W
R215	1-216-021-00	METAL GLAZE	68	5%	1/10W
R216	1-216-081-00	METAL GLAZE	22K	5%	1/10W
R217	1-216-081-00	METAL GLAZE	22K	5%	1/10W
R218	1-216-081-00	METAL GLAZE	22K	5%	1/10W

Ref. No.	Part No.	Description			
R219	1-216-081-00	METAL GLAZE	22K	5%	1/10W
R220	1-216-027-00	METAL GLAZE	120	5%	1/10W
R221	1-216-081-00	METAL GLAZE	22K	5%	1/10W
R222	1-216-081-00	METAL GLAZE	22K	5%	1/10W
R223	1-216-081-00	METAL GLAZE	22K	5%	1/10W
R224	1-216-081-00	METAL GLAZE	22K	5%	1/10W
R225	1-216-065-00	METAL GLAZE	4.7K	5%	1/10W
R226	1-216-065-00	METAL GLAZE	4.7K	5%	1/10W
R227	1-216-073-00	METAL GLAZE	10K	5%	1/10W
R228	1-216-073-00	METAL GLAZE	10K	5%	1/10W
R229	1-216-097-00	METAL GLAZE	100K	5%	1/10W
R230	1-216-097-00	METAL GLAZE	100K	5%	1/10W
R231	1-216-049-00	METAL GLAZE	1K	5%	1/10W
R240	1-216-073-00	METAL GLAZE	10K	5%	1/10W
R241	1-216-097-00	METAL GLAZE	100K	5%	1/10W
R242	1-216-085-00	METAL GLAZE	33K	5%	1/10W
R300	1-216-097-00	METAL GLAZE	100K	5%	1/10W
R301	1-216-295-00	METAL GLAZE	0	5%	1/10W
R302	1-216-049-00	METAL GLAZE	1K	5%	1/10W
R303	1-216-121-00	METAL GLAZE	1M	5%	1/10W
R305	1-216-080-00	METAL GLAZE	20K	5%	1/10W
R306	1-216-080-00	METAL GLAZE	20K	5%	1/10W
R307	1-216-073-00	METAL GLAZE	10K	5%	1/10W
R308	1-216-073-00	METAL GLAZE	10K	5%	1/10W
R309	1-216-085-00	METAL GLAZE	33K	5%	1/10W
R310	1-216-079-00	METAL GLAZE	18K	5%	1/10W
R312	1-216-073-00	METAL GLAZE	10K	5%	1/10W
R313	1-216-083-00	METAL GLAZE	27K	5%	1/10W
R314	1-216-081-00	METAL GLAZE	22K	5%	1/10W
R316	1-216-073-00	METAL GLAZE	10K	5%	1/10W
R318	1-216-049-00	METAL GLAZE	1K	5%	1/10W
R319	1-216-121-00	METAL GLAZE	1M	5%	1/10W
R320	1-216-070-00	METAL GLAZE	7.5K	5%	1/10W
R321	1-216-080-00	METAL GLAZE	20K	5%	1/10W
R322	1-216-689-11	METAL GLAZE	39K	0.5%	1/10W
R323	1-216-058-00	METAL GLAZE	2.4K	5%	1/10W
R324	1-216-073-00	METAL GLAZE	10K	5%	1/10W
R325	1-216-089-00	METAL GLAZE	47K	5%	1/10W
R326	1-216-113-00	METAL GLAZE	470K	5%	1/10W
R327	1-216-683-11	METAL CHIP2	2K	0.50%	1/10W
R328	1-216-683-11	METAL CHIP2	2K	0.50%	1/10W
R329	1-216-097-00	METAL GLAZE	100K	5%	1/10W
R330	1-216-113-00	METAL GLAZE	470K	5%	1/10W
R332	1-216-089-00	METAL GLAZE	47K	5%	1/10W
R333	1-216-093-00	METAL GLAZE	68K	5%	1/10W
R334	1-216-105-00	METAL GLAZE	220K	5%	1/10W
R335	1-216-683-11	METAL CHIP2	2K	0.50%	1/10W
R336	1-216-683-11	METAL CHIP2	2K	0.50%	1/10W
R338	1-216-113-00	METAL GLAZE	470K	5%	1/10W
R339	1-216-121-00	METAL GLAZE	1M	5%	1/10W
R340	1-216-049-00	METAL GLAZE	1K	5%	1/10W
R341	1-216-073-00	METAL GLAZE	10K	5%	1/10W
R345	1-216-097-00	METAL GLAZE	100K	5%	1/10W
R346	1-216-073-00	METAL GLAZE	10K	5%	1/10W
R347	1-216-099-00	METAL GLAZE	120K	5%	1/10W
R349	1-216-097-00	METAL GLAZE	100K	5%	1/10W
R351	1-216-099-00	METAL GLAZE	120K	5%	1/10W
R352	1-216-073-00	METAL GLAZE	10K	5%	1/10W
R353	1-216-117-00	METAL GLAZE	680K	5%	1/10W
R354	1-216-099-00	METAL GLAZE	120K	5%	1/10W
R355	1-216-097-00	METAL GLAZE	100K	5%	1/10W
R356	1-216-683-11	METAL CHIP2	2K	0.50%	1/10W
R357	1-216-676-11	METAL CHIP1	1K	0.50%	1/10W
R358	1-216-683-11	METAL CHIP2	2K	0.50%	1/10W
R359	1-216-676-11	METAL CHIP1	1K	0.50%	1/10W
R360	1-216-001-00	METAL GLAZE	10	5%	1/10W
R361	1-216-081-00	METAL GLAZE	22K	5%	1/10W
R362	1-216-081-00	METAL GLAZE	22K	5%	1/10W
R363	1-216-001-00	METAL GLAZE	10	5%	1/10W
R364	1-216-683-11	METAL CHIP	22K	0.50%	1/10W

Ref. No.	Part No.	Description			
R365	1-216-676-11	METAL CHIP	11K	0.50%	1/10W
R366	1-216-683-11	METAL CHIP	22K	0.50%	1/10W
R367	1-216-676-11	METAL CHIP1	1K	0.50%	1/10W
R368	1-216-001-00	METAL GLAZE	10	5%	1/10W
R369	1-216-081-00	METAL GLAZE	22K	5%	1/10W
R370	1-216-081-00	METAL GLAZE	22K	5%	1/10W
R371	1-216-001-00	METAL GLAZE	10	5%	1/10W
R372	1-216-683-11	METAL CHIP	22K	0.50%	1/10W
R373	1-216-676-11	METAL CHIP	11K	0.50%	1/10W
R374	1-216-683-11	METAL CHIP	22K	0.50%	1/10W
R375	1-216-676-11	METAL CHIP	11K	0.50%	1/10W
R376	1-216-001-00	METAL GLAZE	10	5%	1/10W
R377	1-216-081-00	METAL GLAZE	22K	5%	1/10W
R378	1-216-081-00	METAL GLAZE	22K	5%	1/10W
R379	1-216-001-00	METAL GLAZE	10	5%	1/10W
R380	1-216-651-11	METAL CHIP	1K	0.50%	1/10W
R381	1-216-651-11	METAL CHIP	1K	0.50%	1/10W
R382	1-216-096-00	METAL GLAZE	91K	5%	1/10W
R383	1-216-076-00	METAL GLAZE	13K	5%	1/10W
R384	1-216-081-00	METAL GLAZE	22K	5%	1/10W
R385	1-216-101-00	METAL GLAZE	150K	5%	1/10W
R386	1-216-071-00	METAL GLAZE	8.2K	5%	1/10W
R387	1-216-073-00	METAL GLAZE	10K	5%	1/10W
R388	1-216-073-00	METAL GLAZE	10K	5%	1/10W
R392	1-216-073-00	METAL GLAZE	10K	5%	1/10W
R393	1-216-073-00	METAL GLAZE	10K	5%	1/10W
R394	1-216-073-00	METAL GLAZE	10K	5%	1/10W
R395	1-216-073-00	METAL GLAZE	10K	5%	1/10W
R396	1-216-073-00	METAL GLAZE	10K	5%	1/10W
R397	1-216-097-00	METAL GLAZE	100K	5%	1/10W
R398	1-216-105-00	METAL GLAZE	220K	5%	1/10W
R399	1-216-065-00	METAL GLAZE	4.7K	5%	1/10W
R401	1-216-095-00	METAL GLAZE	82K	5%	1/10W
R402	1-216-097-00	METAL GLAZE	100K	5%	1/10W
R403	1-216-079-00	METAL GLAZE	18K	5%	1/10W
R404	1-216-096-00	METAL GLAZE	91K	5%	1/10W
R405	1-216-095-00	METAL GLAZE	82K	5%	1/10W
R406	1-216-121-00	METAL GLAZE	1M	5%	1/10W
R407	1-216-112-00	METAL GLAZE	430K	5%	1/10W
R408	1-216-095-00	METAL GLAZE	82K	5%	1/10W
R409	1-216-097-00	METAL GLAZE	100K	5%	1/10W
R410	1-216-121-00	METAL GLAZE	1M	5%	1/10W
R411	1-216-082-00	METAL GLAZE	24K	5%	1/10W
R412	1-216-651-11	METAL CHIP	1K	0.50%	1/10W
R413	1-216-651-11	METAL CHIP	1K	0.50%	1/10W
R414	1-216-651-11	METAL CHIP	1K	0.50%	1/10W
R415	1-216-651-11	METAL CHIP	1K	0.50%	1/10W
R416	1-216-651-11	METAL CHIP	1K	0.50%	1/10W
R417	1-216-651-11	METAL CHIP	1K	0.50%	1/10W
R418	1-216-063-00	METAL GLAZE	3.9K	5%	1/10W
R419	1-216-072-00	METAL GLAZE	9.1K	5%	1/10W
R420	1-216-072-00	METAL GLAZE	9.1K	5%	1/10W
R421	1-216-083-00	METAL GLAZE	27K	5%	1/10W
R422	1-216-083-00	METAL GLAZE	27K	5%	1/10W
R423	1-216-083-00	METAL GLAZE	27K	5%	1/10W
R424	1-216-077-00	METAL GLAZE	15K	5%	1/10W
R425	1-216-065-00	METAL GLAZE	4.7K	5%	1/10W
R426	1-216-113-00	METAL GLAZE	470K	5%	1/10W
R427	1-216-081-00	METAL GLAZE	22K	5%	1/10W
R428	1-216-121-00	METAL GLAZE	1M	5%	1/10W
R429	1-216-080-00	METAL GLAZE	20K	5%	1/10W
R430	1-216-113-00	METAL GLAZE	470K	5%	1/10W
R431	1-216-073-00	METAL GLAZE	10K	5%	1/10W
R432	1-216-121-00	METAL GLAZE	1M	5%	1/10W
R433	1-216-121-00	METAL GLAZE	1M	5%	1/10W
R434	1-216-085-00	METAL GLAZE	33K	5%	1/10W
R435	1-216-073-00	METAL GLAZE	10K	5%	1/10W
R436	1-216-699-11	METAL CHIP	100K	0.50%	1/10W
R437	1-216-699-11	METAL CHIP	100K	0.50%	1/10W
R438	1-216-097-00	METAL GLAZE	100K	5%	1/10W

Ref. No.	Part No.	Description			
R439	1-216-097-00	METAL GLAZE	100K	5%	1/10W
R440	1-216-667-11	METAL CHIP	4.7K	0.50%	1/10W
R441	1-216-667-11	METAL CHIP	4.7K	0.50%	1/10W
R442	1-216-113-00	METAL GLAZE	470K	5%	1/10W
R443	1-216-051-00	METAL GLAZE	1.2K	5%	1/10W
R444	1-216-059-00	METAL GLAZE	2.7K	5%	1/10W
R445	1-216-073-00	METAL GLAZE	10K	5%	1/10W
R446	1-216-049-00	METAL GLAZE	1K	5%	1/10W
R447	1-216-049-00	METAL GLAZE	1K	5%	1/10W
R448	1-216-096-00	METAL GLAZE	91K	5%	1/10W
R449	1-216-101-00	METAL GLAZE	150K	5%	1/10W
R450	1-216-085-00	METAL GLAZE	33K	5%	1/10W
R451	1-216-086-00	METAL GLAZE	36K	5%	1/10W
R452	1-216-097-00	METAL GLAZE	100K	5%	1/10W
R453	1-216-061-00	METAL GLAZE	3.3K	5%	1/10W
R454	1-216-055-00	METAL GLAZE	1.8K	5%	1/10W
R455	1-216-057-00	METAL GLAZE	2.2K	5%	1/10W
R456	1-216-049-00	METAL GLAZE	1K	5%	1/10W
R457	1-216-089-00	METAL GLAZE	47K	5%	1/10W
R458	1-216-097-00	METAL GLAZE	100K	5%	1/10W
R459	1-216-061-00	METAL GLAZE	3.3K	5%	1/10W
R460	1-216-063-00	METAL GLAZE	3.9K	5%	1/10W
R461	1-216-058-00	METAL GLAZE	2.4K	5%	1/10W
R462	1-216-049-00	METAL GLAZE	1K	5%	1/10W
R463	1-216-089-00	METAL GLAZE	47K	5%	1/10W
R464	1-216-089-00	METAL GLAZE	47K	5%	1/10W
R465	1-216-089-00	METAL GLAZE	47K	5%	1/10W
R466	1-216-089-00	METAL GLAZE	47K	5%	1/10W
R467	1-216-089-00	METAL GLAZE	47K	5%	1/10W
R468	1-216-089-00	METAL GLAZE	47K	5%	1/10W
R469	1-216-089-00	METAL GLAZE	47K	5%	1/10W
R470	1-216-103-00	METAL GLAZE	180K	5%	1/10W
R471	1-216-057-00	METAL GLAZE	2.2K	5%	1/10W
R472	1-216-073-00	METAL GLAZE	10K	5%	1/10W
R473	1-216-089-00	METAL GLAZE	47K	5%	1/10W
R475	1-216-689-11	METAL GLAZE	39K	0.50%	1/10W
R476	1-216-073-00	METAL GLAZE	10K	5%	1/10W
R477	1-216-113-00	METAL GLAZE	470K	5%	1/10W
R478	1-216-689-11	METAL GLAZE	39K	0.50%	1/10W
R479	1-216-667-11	METAL CHIP	4.7K	0.50%	1/10W
R480	1-216-667-11	METAL CHIP	4.7K	0.50%	1/10W
R490	1-216-069-00	METAL GLAZE	6.8K	5%	1/10W
R502	1-216-075-00	METAL GLAZE	12K	5%	1/10W
R503	1-216-081-00	METAL GLAZE	22K	5%	1/10W
R504	1-216-073-00	METAL GLAZE	10K	5%	1/10W
R505	1-216-049-00	METAL GLAZE	1K	5%	1/10W
R506	1-216-097-00	METAL GLAZE	100K	5%	1/10W
R507	1-216-073-00	METAL GLAZE	10K	5%	1/10W
R508	1-216-065-00	METAL GLAZE	4.7K	5%	1/10W
R510	1-216-089-00	METAL GLAZE	47K	5%	1/10W
R511	1-216-667-11	METAL CHIP	4.7K	0.50%	1/10W
R512	1-216-668-11	METAL CHIP	5.1K	0.50%	1/10W
R513	1-216-073-00	METAL GLAZE	10K	5%	1/10W
R516	1-216-065-00	METAL GLAZE	4.7K	5%	1/10W
R517	1-216-065-00	METAL GLAZE	4.7K	5%	1/10W
R520	1-216-051-00	METAL GLAZE	1.2K	5%	1/10W
R521	1-216-059-00	METAL GLAZE	2.7K	5%	1/10W
R523	1-216-097-00	METAL GLAZE	100K	5%	1/10W
R524	1-216-121-00	METAL GLAZE	1M	5%	1/10W
R525	1-216-025-00	METAL GLAZE	100	5%	1/10W
R526	1-216-025-00	METAL GLAZE	100	5%	1/10W
R531	1-216-097-00	METAL GLAZE	100K	5%	1/10W
R540	1-216-049-00	METAL GLAZE	1K	5%	1/10W
R541	1-216-049-00	METAL GLAZE	1K	5%	1/10W
R701	1-216-066-00	METAL GLAZE	5.1K	5%	1/10W
R702	1-216-066-00	METAL GLAZE	5.1K	5%	1/10W
R703	1-216-073-00	METAL GLAZE	10K	5%	1/10W
R720	1-216-667-11	METAL CHIP	4.7K	0.50%	1/10W
R725	1-216-073-00	METAL GLAZE	10K	5%	1/10W
R726	1-216-073-00	METAL GLAZE	10K	5%	1/10W

Ref. No.	Part No.	Description			
R727	1-216-674-11	METAL CHIP	9.1K	0.50%	1/10W
R728	1-216-073-00	METAL GLAZE	10K	5%	1/10W
R729	1-216-061-00	METAL GLAZE	3.3K	5%	1/10W
R730	1-216-347-11	METAL OXIDE	0.68	5%	1W F
R731	1-216-031-00	METAL GLAZE	180	5%	1/10W
R732	1-216-683-11	METAL CHIP	22K	0.50%	1/10W
R733	1-216-683-11	METAL CHIP	22K	0.50%	1/10W
R734	1-216-683-11	METAL CHIP	22	0.50%	1/10W
R735	1-216-683-11	METAL CHIP	22	0.50%	1/10W
R736	1-216-194-00	METAL GLAZE	680	5%	1/8W
R737	1-216-665-11	METAL CHIP	3.9K	0.50%	1/10W
R738	1-216-672-11	METAL CHIP	7.5K	0.50%	1/10W
R739	1-216-194-00	METAL GLAZE	680	5%	1/8W
R740	1-216-073-00	METAL GLAZE	10K	5%	1/10W
R741	1-216-073-00	METAL GLAZE	10K	5%	1/10W
R742	1-216-073-00	METAL GLAZE	10K	5%	1/10W
R743	1-216-073-00	METAL GLAZE	10K	5%	1/10W
R744	1-216-073-00	METAL GLAZE	10K	5%	1/10W
R745	1-216-073-00	METAL GLAZE	10K	5%	1/10W
R746	1-216-073-00	METAL GLAZE	10K	5%	1/10W
R747	1-216-073-00	METAL GLAZE	10K	5%	1/10W
R748	1-216-073-00	METAL GLAZE	10K	5%	1/10W
R749	1-216-073-00	METAL GLAZE	10K	5%	1/10W
R750	1-216-073-00	METAL GLAZE	10K	5%	1/10W
R753	1-216-073-00	METAL GLAZE	10K	5%	1/10W
R754	1-216-073-00	METAL GLAZE	10K	5%	1/10W
R755	1-216-037-00	METAL GLAZE	330	5%	1/10W
R756	1-216-037-00	METAL GLAZE	330	5%	1/10W
R757	1-216-037-00	METAL GLAZE	330	5%	1/10W
R758	1-216-037-00	METAL GLAZE	330	5%	1/10W
R759	1-216-037-00	METAL GLAZE	330	5%	1/10W
R760	1-216-073-00	METAL GLAZE	10K	5%	1/10W
R761	1-216-073-00	METAL GLAZE	10K	5%	1/10W
R762	1-216-073-00	METAL GLAZE	10K	5%	1/10W
R763	1-216-073-00	METAL GLAZE	10K	5%	1/10W
R764	1-216-073-00	METAL GLAZE	10K	5%	1/10W
R765	1-216-073-00	METAL GLAZE	10K	5%	1/10W
R770	1-216-073-00	METAL GLAZE	10K	5%	1/10W
R771	1-216-073-00	METAL GLAZE	10K	5%	1/10W
R772	1-216-073-00	METAL GLAZE	10K	5%	1/10W
R773	1-216-073-00	METAL GLAZE	10K	5%	1/10W
R774	1-216-073-00	METAL GLAZE	10K	5%	1/10W
R775	1-216-073-00	METAL GLAZE	10K	5%	1/10W
R776	1-216-073-00	METAL GLAZE	10K	5%	1/10W
R777	1-216-073-00	METAL GLAZE	10K	5%	1/10W
R778	1-216-073-00	METAL GLAZE	10K	5%	1/10W
R779	1-216-073-00	METAL GLAZE	10K	5%	1/10W
R780	1-216-073-00	METAL GLAZE	10K	5%	1/10W
R781	1-216-033-00	METAL GLAZE	220	5%	1/10W
R782	1-216-031-00	METAL GLAZE	180	5%	1/10W
R783	1-216-043-00	METAL GLAZE	560	5%	1/10W
R784	1-216-043-00	METAL GLAZE	560	5%	1/10W
R785	1-216-029-00	METAL GLAZE	150	5%	1/10W
R786	1-216-037-00	METAL GLAZE	330	5%	1/10W
R787	1-216-037-00	METAL GLAZE	330	5%	1/10W
R788	1-216-073-00	METAL GLAZE	10K	5%	1/10W
R789	1-216-073-00	METAL GLAZE	10K	5%	1/10W
R790	1-216-073-00	METAL GLAZE	10K	5%	1/10W
R791	1-216-073-00	METAL GLAZE	10K	5%	1/10W
R792	1-216-073-00	METAL GLAZE	10K	5%	1/10W
R793	1-216-073-00	METAL GLAZE	10K	5%	1/10W
R794	1-216-073-00	METAL GLAZE	10K	5%	1/10W
R795	1-216-073-00	METAL GLAZE	10K	5%	1/10W
R796	1-216-073-00	METAL GLAZE	10K	5%	1/10W
R797	1-216-073-00	METAL GLAZE	10K	5%	1/10W
R798	1-216-073-00	METAL GLAZE	10K	5%	1/10W
R810	1-216-073-00	METAL GLAZE	10K	5%	1/10W
R811	1-216-073-00	METAL GLAZE	10K	5%	1/10W
R812	1-216-073-00	METAL GLAZE	10K	5%	1/10W
R813	1-216-073-00	METAL GLAZE	10K	5%	1/10W

Ref. No.	Part No.	Description			
R814	1-216-073-00	METAL GLAZE	10K	5%	1/10W
R815	1-216-073-00	METAL GLAZE	10K	5%	1/10W
R816	1-216-073-00	METAL GLAZE	10K	5%	1/10W
R817	1-216-073-00	METAL GLAZE	10K	5%	1/10W
R818	1-216-073-00	METAL GLAZE	10K	5%	1/10W
R819	1-216-073-00	METAL GLAZE	10K	5%	1/10W
R820	1-216-073-00	METAL GLAZE	10K	5%	1/10W
R821	1-216-073-00	METAL GLAZE	10K	5%	1/10W
R822	1-216-073-00	METAL GLAZE	10K	5%	1/10W
R823	1-216-073-00	METAL GLAZE	10K	5%	1/10W
R824	1-216-073-00	METAL GLAZE	10K	5%	1/10W
R825	1-216-073-00	METAL GLAZE	10K	5%	1/10W
R830	1-216-073-00	METAL GLAZE	10K	5%	1/10W
R831	1-216-073-00	METAL GLAZE	10K	5%	1/10W
R832	1-216-073-00	METAL GLAZE	10K	5%	1/10W
R833	1-216-073-00	METAL GLAZE	10K	5%	1/10W
R834	1-216-073-00	METAL GLAZE	10K	5%	1/10W
R835	1-216-073-00	METAL GLAZE	10K	5%	1/10W
R836	1-216-073-00	METAL GLAZE	10K	5%	1/10W
R837	1-216-073-00	METAL GLAZE	10K	5%	1/10W
R838	1-216-073-00	METAL GLAZE	10K	5%	1/10W
R839	1-216-073-00	METAL GLAZE	10K	5%	1/10W
R840	1-216-073-00	METAL GLAZE	10K	5%	1/10W
R841	1-216-073-00	METAL GLAZE	10K	5%	1/10W
R842	1-216-073-00	METAL GLAZE	10K	5%	1/10W
R843	1-216-073-00	METAL GLAZE	10K	5%	1/10W
R844	1-216-073-00	METAL GLAZE	10K	5%	1/10W
R845	1-216-073-00	METAL GLAZE	10K	5%	1/10W
R846	1-216-073-00	METAL GLAZE	10K	5%	1/10W
R847	1-216-073-00	METAL GLAZE	10K	5%	1/10W
R848	1-216-073-00	METAL GLAZE	10K	5%	1/10W
R849	1-216-073-00	METAL GLAZE	10K	5%	1/10W
R850	1-216-073-00	METAL GLAZE	10K	5%	1/10W
R851	1-216-073-00	METAL GLAZE	10K	5%	1/10W
R852	1-216-073-00	METAL GLAZE	10K	5%	1/10W
R853	1-216-073-00	METAL GLAZE	10K	5%	1/10W
R854	1-216-073-00	METAL GLAZE	10K	5%	1/10W
R855	1-216-073-00	METAL GLAZE	10K	5%	1/10W
R856	1-216-073-00	METAL GLAZE	10K	5%	1/10W
R857	1-216-073-00	METAL GLAZE	10K	5%	1/10W
R858	1-216-073-00	METAL GLAZE	10K	5%	1/10W
R859	1-216-073-00	METAL GLAZE	10K	5%	1/10W
R860	1-216-073-00	METAL GLAZE	10K	5%	1/10W
R861	1-216-073-00	METAL GLAZE	10K	5%	1/10W
R862	1-216-073-00	METAL GLAZE	10K	5%	1/10W
R863	1-216-073-00	METAL GLAZE	10K	5%	1/10W
R870	1-216-073-00	METAL GLAZE	10K	5%	1/10W
R871	1-216-073-00	METAL GLAZE	10K	5%	1/10W
R872	1-216-073-00	METAL GLAZE	10K	5%	1/10W
R873	1-216-073-00	METAL GLAZE	10K	5%	1/10W
R874	1-216-073-00	METAL GLAZE	10K	5%	1/10W
R875	1-216-073-00	METAL GLAZE	10K	5%	1/10W
R876	1-216-073-00	METAL GLAZE	10K	5%	1/10W
R877	1-216-073-00	METAL GLAZE	10K	5%	1/10W
R878	1-216-073-00	METAL GLAZE	10K	5%	1/10W
R879	1-216-073-00	METAL GLAZE	10K	5%	1/10W
R880	1-216-073-00	METAL GLAZE	10K	5%	1/10W
R881	1-216-073-00	METAL GLAZE	10K	5%	1/10W
R882	1-216-073-00	METAL GLAZE	10K	5%	1/10W
R883	1-216-073-00	METAL GLAZE	10K	5%	1/10W
R884	1-216-073-00	METAL GLAZE	10K	5%	1/10W
R885	1-216-073-00	METAL GLAZE	10K	5%	1/10W
R886	1-216-073-00	METAL GLAZE	10K	5%	1/10W
R887	1-216-073-00	METAL GLAZE	10K	5%	1/10W
R888	1-216-073-00	METAL GLAZE	10K	5%	1/10W
R889	1-216-073-00	METAL GLAZE	10K	5%	1/10W
R890	1-216-073-00	METAL GLAZE	10K	5%	1/10W
R891	1-216-073-00	METAL GLAZE	10K	5%	1/10W
R892	1-216-073-00	METAL GLAZE	10K	5%	1/10W
R893	1-216-073-00	METAL GLAZE	10K	5%	1/10W

Ref. No.	Part No.	Description			
R901	1-216-295-00	METAL GLAZE	0	5%	1/10W
R902	1-216-295-00	METAL GLAZE	0	5%	1/10W
R903	1-216-295-00	METAL GLAZE	0	5%	1/10W
R904	1-216-295-00	METAL GLAZE	0	5%	1/10W
R905	1-216-295-00	METAL GLAZE	0	5%	1/10W
R906	1-216-295-00	METAL GLAZE	0	5%	1/10W
		RESISTOR BLOCK			
RB728	1-235-005-00	RESISTOR BLOCK 47K			
RB729	1-235-005-00	RESISTOR BLOCK 47K			
		VARIABLE RESISTOR			
RV101	1-226-773-11	RES, ADJ, METAL GLAZE 22K			
RV301	1-226-771-11	RES, ADJ, METAL GLAZE 1K			
RV302	1-226-775-11	RES, ADJ, METAL GLAZE 100K			
RV303	1-226-703-11	RES, ADJ, METAL GLAZE 10K			
RV304	1-226-703-11	RES, ADJ, METAL GLAZE 10K			
RV401	1-226-703-11	RES, ADJ, METAL GLAZE 10K			
RV501	1-226-703-11	RES, ADJ, METAL GLAZE 10K			
RV502	1-226-771-11	RES, ADJ, METAL GLAZE 1K			
		RELAY			
RY701	1-515-614-11	RELAY			
		SWITCH			
S701	1-570-909-11	SWITCH, TACTIL (REFLOW TYPE)			
S702	1-570-909-11	SWITCH, TACTIL (REFLOW TYPE)			
		OSCILLATOR			
X501	1-579-647-11	VIBRATOR, CERAMIC			
X701	1-579-165-11	OSCILLATOR, CRYSTAL			

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ENCODER

Ref. No.	Part No.	Description		
C1794	1-163-038-00	CERAMIC CHIP 0.1MF		25V
C1795	1-163-038-00	CERAMIC CHIP 0.1MF		25V
C1796	1-163-038-00	CERAMIC CHIP 0.1MF		25V
C1797	1-163-038-00	CERAMIC CHIP 0.1MF		25V
C1798	1-163-038-00	CERAMIC CHIP 0.1MF		25V
C1799	1-163-038-00	CERAMIC CHIP 0.1MF		25V
C1801	1-135-177-21	TANTAL. CHIP 1MF	20%	25V
C1802	1-163-227-11	CERAMIC CHIP 10PF	5%	50V
C1803	1-163-227-11	CERAMIC CHIP 10PF	5%	50V
C1804	1-163-038-00	CERAMIC CHIP 0.1MF		25V
C1810	1-163-077-00	CERAMIC CHIP 0.1MF		50V
C1811	1-163-077-00	CERAMIC CHIP 0.1MF		50V
C1812	1-163-275-11	CERAMIC CHIP 0.001MF	5%	50V
C1820	1-163-251-11	CERAMIC CHIP 100PF	5%	50V
C1821	1-163-038-00	CERAMIC CHIP 0.1MF		25V
C1822	1-163-038-00	CERAMIC CHIP 0.1MF		25V
C1823	1-163-038-00	CERAMIC CHIP 0.1MF		25V
C1824	1-135-138-11	TANTAL. CHIP 10MF	20%	25V
C1840	1-135-177-21	TANTAL. CHIP 1MF	20%	25V
C1841	1-163-038-00	CERAMIC CHIP 0.1MF		25V
C1842	1-135-177-21	TANTAL. CHIP 1MF	20%	25V
C1843	1-163-038-00	CERAMIC CHIP 0.1MF		25V
C1900	1-163-038-00	CERAMIC CHIP 0.1MF		25V
C1901	1-163-038-00	CERAMIC CHIP 0.1MF		25V
C1902	1-163-038-00	CERAMIC CHIP 0.1MF		25V
C1903	1-163-038-00	CERAMIC CHIP 0.1MF		25V
C1904	1-163-038-00	CERAMIC CHIP 0.1MF		25V
C1905	1-163-038-00	CERAMIC CHIP 0.1MF		25V
C1906	1-163-038-00	CERAMIC CHIP 0.1MF		25V
C1907	1-163-038-00	CERAMIC CHIP 0.1MF		25V
C1908	1-163-038-00	CERAMIC CHIP 0.1MF		25V
C1909	1-163-038-00	CERAMIC CHIP 0.1MF		25V

CONNECTOR

CN1103	*1-506-471-11	PIN, CONNECTOR 6P
CN1201	*1-564-512-11	PLUG, CONNECTOR 9P
CN1202	*1-506-473-11	PIN, CONNECTOR 8P
CN1401	1-566-312-11	HEADER, CONNECTOR 50P
CN1501	*1-565-429-11	HEADER, CONNECTOR 34P
CN1502	*1-506-475-11	PIN, CONNECTOR 10P
CN1701	*1-564-241-00	PIN, CONNECTOR (B4P-VH) 4P
CN1702	*1-564-508-11	PLUG, CONNECTOR 5P
CN1801	1-566-311-11	HEADER, CONNECTOR 10P
CN1802	*1-564-512-11	PLUG, CONNECTOR 9P

DIODE

D0	8-719-940-16	DIODE	GL1PR51
D1	8-719-940-16	DIODE	GL1PR51
D2	8-719-940-16	DIODE	GL1PR51
D3	8-719-940-16	DIODE	GL1PR51
D4	8-719-940-16	DIODE	GL1PR51
D5	8-719-940-16	DIODE	GL1PR51
D6	8-719-940-16	DIODE	GL1PR51
D7	8-719-940-16	DIODE	GL1PR51
D8	8-719-940-16	DIODE	GL1PR51
D9	8-719-940-16	DIODE	GL1PR51
D10	8-719-940-16	DIODE	GL1PR51
D11	8-719-940-16	DIODE	GL1PR51
D12	8-719-940-16	DIODE	GL1PR51
D13	8-719-940-16	DIODE	GL1PR51
D14	8-719-940-16	DIODE	GL1PR51
D15	8-719-940-16	DIODE	GL1PR51
D1401	8-719-210-39	DIODE	EC10QS-04
D1501	8-719-210-39	DIODE	EC10QS-04
D1502	8-719-210-39	DIODE	EC10QS-04
D1503	8-719-210-39	DIODE	EC10QS-04
D1701	8-719-940-16	DIODE	GL1PR51
D1810	8-719-800-09	DIODE	1SV101
DB1501	8-719-947-01	DIODE	FMP1
DB1502	8-719-947-01	DIODE	FMP1
DB1503	8-719-947-01	DIODE	FMP1
DB1504	8-719-947-01	DIODE	FMP1

FUSE

F1501	1-532-776-41	FUSE, MICRO (SECONDARY)

IC

IC1101	8-759-242-61	IC	TMP68301F-12
IC1102	8-759-321-70	IC	HD63450CP10
IC1103	8-759-605-21	IC	M51953AFP
IC1104	8-759-060-97	IC	PEEL18CV8SC-E1104B
IC1105	8-759-058-35	IC	LT1181CS
IC1106	8-759-926-49	IC	SN74HC245ANS
IC1107	8-759-926-14	IC	SN74HC148NS
IC1108	8-759-926-80	IC	SN74HC573BNS
IC1109	8-759-926-80	IC	SN74HC573BNS
IC1110	8-759-926-11	IC	SN74HC138ANS
IC1111	8-759-164-37	IC	AM27C1024-ENC1.14
IC1113	8-759-060-98	IC	PEEL18CV8SC-E1113
IC1114	8-759-060-99	IC	PEEL18CV8SC-E1114B
IC1115	8-759-061-00	IC	PEEL18CV8SC-E1115
IC1116	8-759-926-06	IC	SN74HC126ANS
IC1117	8-759-925-74	IC	SN74HC04ANS
IC1118	8-759-925-90	IC	SN74HC74ANS
IC1201	8-752-337-26	IC	CXD2500AQ
IC1202	8-759-927-29	IC	SN74HCU04ANS
IC1203	8-759-926-24	IC	SN74HC164ANS
IC1204	8-759-926-24	IC	SN74HC164ANS
IC1205	8-759-061-01	IC	PEEL18CV8SC-E1205C
IC1206	8-759-061-02	IC	PEEL18CV8SC-E1206B
IC1207	8-759-058-21	IC	AM4601-35JC
IC1208	8-759-058-21	IC	AM4601-35JC
IC1209	8-759-926-24	IC	SN74HC164ANS
IC1210	8-759-058-21	IC	AM4601-35JC
IC1211	8-759-239-62	IC	TC74HC279AF
IC1212	8-759-061-03	IC	PEEL18CV8SC-E1212D
IC1213	8-759-058-21	IC	AM4601-35JC
IC1214	8-759-058-21	IC	AM4601-35JC
IC1215	8-759-058-21	IC	AM4601-35JC
IC1216	8-759-926-26	IC	SN74HC166ANS
IC1217	8-759-926-26	IC	SN74HC166ANS
IC1301	8-759-501-83	IC	MB1431A
IC1302	8-759-061-04	IC	PEEL18CV8SC-E1302B
IC1303	8-759-926-49	IC	SN74HC245ANS
IC1304	8-759-926-49	IC	SN74HC245ANS
IC1305	8-759-061-26	IC	MT4C4001JDJ-8
IC1306	8-759-061-26	IC	MT4C4001JDJ-8
IC1307	8-759-061-26	IC	MT4C4001JDJ-8
IC1308	8-759-061-26	IC	MT4C4001JDJ-8
IC1309	8-759-061-26	IC	MT4C4001JDJ-8
IC1310	8-759-061-26	IC	MT4C4001JDJ-8
IC1311	8-759-061-26	IC	MT4C4001JDJ-8
IC1312	8-759-061-26	IC	MT4C4001JDJ-8
IC1401	8-759-058-15	IC	NCR53C96
IC1402	8-759-061-05	IC	PEEL18CV8SC-E1402C
IC1501	8-759-926-82	IC	SN74HC574ANS
IC1502	8-759-926-82	IC	SN74HC574ANS
IC1503	8-759-926-82	IC	SN74HC574ANS
IC1504	8-759-926-77	IC	SN74HC541ANS
IC1505	8-759-926-77	IC	SN74HC541ANS
IC1506	8-759-926-77	IC	SN74HC541ANS
IC1507	8-759-926-82	IC	SN74HC574ANS
IC1508	8-759-926-82	IC	SN74HC574ANS
IC1509	8-759-923-65	IC	AM26LS31CNS
IC1601	8-759-113-06	IC	CXD1037G
IC1602	8-752-330-98	IC	CXK5864BM-10L
IC1603	8-759-926-26	IC	SN74HC166ANS
IC1604	8-759-926-26	IC	SN74HC166ANS
IC1605	8-759-061-06	IC	PEEL18CV8SC-E1605

Ref. No.	Part No.	Description
IC1606	8-759-061-07	IC PEEL18CV8SC-E1606
IC1607	8-759-061-08	IC PEEL18CV8SC-E1607B
IC1608	8-759-061-09	IC PEEL18CV8SC-E1608
IC1609	8-759-926-24	IC SN74HC164NS
IC1610	8-759-926-82	IC SN74HC574ANS
IC1611	8-759-926-23	IC SN74HC163ANS
IC1612	8-759-926-23	IC SN74HC163ANS
IC1613	8-759-926-23	IC SN74HC163ANS
IC1614	8-759-926-23	IC SN74HC163ANS
IC1615	8-759-071-04	IC MBM27C512P-E1615A
IC1616	8-759-071-05	IC MBM27C512P-E1616B
IC1617	8-759-071-06	IC MBM27C512P-E1617C
IC1618	8-759-927-18	IC SN74HCT541ANS
IC1619	8-759-926-26	IC SN74HC166ANS
IC1620	8-759-061-10	IC PEEL18CV8SC-E1620B
IC1621	8-759-926-26	IC SN74HC166ANS
IC1701	8-759-979-60	IC 74F401PC
IC1702	8-759-061-11	IC PEEL18CV8SC-E1702
IC1703	8-759-061-12	IC PEEL18CV8SC-E1703B
IC1707	8-759-926-26	IC SN74HC166ANS
IC1708	8-759-061-13	IC PEEL18CV8SC-E1708B
IC1709	8-759-926-26	IC SN74HC166ANS
IC1710	8-759-926-26	IC SN74HC166ANS
IC1711	8-759-926-24	IC SN74HC164NS
IC1712	8-759-924-24	IC SN74HC164NS
IC1801	8-752-336-78	IC CXD2520Q
IC1802	8-752-330-98	IC CXK5864BM-10L
IC1804	8-759-927-29	IC SN74HCU04ANS
IC1805	8-759-061-14	IC PEEL18CV8SC-E1805B
IC1806	8-759-061-15	IC PEEL18CV8SC-E1806
IC1811	8-759-981-78	IC RC3404AM-T1
IC1812	8-759-030-59	IC MC1648P-1
IC1813	8-759-012-03	IC MC10H131M-T1
IC1814	8-759-012-13	IC MC10H125M-T1
IC1815	8-759-931-65	IC SN74S00NS
IC1816	8-759-925-90	IC SN74HC74ANS
IC1840	8-759-604-35	IC M5F78M05L
		IC SOCKET
ICS111	*1-526-662-21	SOCKET, IC (DP) 40P
		INDUCTOR
L1201	1-408-771-11	INDUCTOR CHIP 3.3UH
L1202	1-408-771-11	INDUCTOR CHIP 3.3UH
L1820	1-408-068-00	INDUCTOR 33UH
L1821	1-460-321-11	COIL
L1840	1-408-068-00	INDUCTOR 33UH
		TRANSISTOR
Q1401	8-729-119-76	TRANSISTOR 2SA1175-HFE
Q1402	8-729-205-32	TRANSISTOR 2SB553-Y
		RESISTOR
R1101	1-216-073-00	METAL GLAZE 10K 5% 1/10W
R1102	1-216-065-00	METAL GLAZE 4.7K 5% 1/10W
R1103	1-216-065-00	METAL GLAZE 4.7K 5% 1/10W
R1104	1-216-049-00	METAL GLAZE 1K 5% 1/10W
R1105	1-216-073-00	METAL GLAZE 10K 5% 1/10W
R1106	1-216-073-00	METAL GLAZE 10K 5% 1/10W
R1107	1-216-065-00	METAL GLAZE 4.7K 5% 1/10W
R1108	1-216-065-00	METAL GLAZE 4.7K 5% 1/10W
R1110	1-216-073-00	METAL GLAZE 10K 5% 1/10W
R1111	1-216-073-00	METAL GLAZE 10K 5% 1/10W
R1112	1-216-073-00	METAL GLAZE 10K 5% 1/10W
R1113	1-216-073-00	METAL GLAZE 10K 5% 1/10W
R1114	1-216-073-00	METAL GLAZE 10K 5% 1/10W
R1115	1-216-073-00	METAL GLAZE 10K 5% 1/10W
R1116	1-216-073-00	METAL GLAZE 10K 5% 1/10W
R1117	1-216-073-00	METAL GLAZE 10K 5% 1/10W
R1118	1-216-073-00	METAL GLAZE 10K 5% 1/10W
R1119	1-216-073-00	METAL GLAZE 10K 5% 1/10W
R1120	1-216-073-00	METAL GLAZE 10K 5% 1/10W
R1121	1-216-073-00	METAL GLAZE 10K 5% 1/10W
R1122	1-216-073-00	METAL GLAZE 10K 5% 1/10W
R1123	1-216-073-00	METAL GLAZE 10K 5% 1/10W
R1124	1-216-073-00	METAL GLAZE 10K 5% 1/10W
R1125	1-216-073-00	METAL GLAZE 10K 5% 1/10W
R1126	1-216-073-00	METAL GLAZE 10K 5% 1/10W
R1127	1-216-073-00	METAL GLAZE 10K 5% 1/10W
R1128	1-216-073-00	METAL GLAZE 10K 5% 1/10W
R1129	1-216-073-00	METAL GLAZE 10K 5% 1/10W
R1130	1-216-073-00	METAL GLAZE 10K 5% 1/10W
R1131	1-216-073-00	METAL GLAZE 10K 5% 1/10W
R1132	1-216-073-00	METAL GLAZE 10K 5% 1/10W
R1133	1-216-073-00	METAL GLAZE 10K 5% 1/10W
R1134	1-216-073-00	METAL GLAZE 10K 5% 1/10W
R1135	1-216-073-00	METAL GLAZE 10K 5% 1/10W
R1136	1-216-073-00	METAL GLAZE 10K 5% 1/10W
R1137	1-216-073-00	METAL GLAZE 10K 5% 1/10W
R1138	1-216-073-00	METAL GLAZE 10K 5% 1/10W
R1139	1-216-073-00	METAL GLAZE 10K 5% 1/10W
R1140	1-216-073-00	METAL GLAZE 10K 5% 1/10W
R1141	1-216-073-00	METAL GLAZE 10K 5% 1/10W
R1142	1-216-073-00	METAL GLAZE 10K 5% 1/10W
R1143	1-216-073-00	METAL GLAZE 10K 5% 1/10W
R1144	1-216-073-00	METAL GLAZE 10K 5% 1/10W
R1145	1-216-073-00	METAL GLAZE 10K 5% 1/10W
R1201	1-216-049-00	METAL GLAZE 1K 5% 1/10W
R1202	1-216-049-00	METAL GLAZE 1K 5% 1/10W
R1203	1-216-073-00	METAL GLAZE 10K 5% 1/10W
R1204	1-216-057-00	METAL GLAZE 2.2K 5% 1/10W
R1205	1-216-103-00	METAL GLAZE 180K 5% 1/10W
R1207	1-216-073-00	METAL GLAZE 10K 5% 1/10W
R1211	1-216-073-00	METAL GLAZE 10K 5% 1/10W
R1301	1-216-073-00	METAL GLAZE 10K 5% 1/10W
R1302	1-216-009-00	METAL GLAZE 22 5% 1/10W
R1303	1-216-009-00	METAL GLAZE 22 5% 1/10W
R1304	1-216-009-00	METAL GLAZE 22 5% 1/10W
R1305	1-216-009-00	METAL GLAZE 22 5% 1/10W
R1310	1-216-009-00	METAL GLAZE 22 5% 1/10W
R1311	1-216-009-00	METAL GLAZE 22 5% 1/10W
R1312	1-216-009-00	METAL GLAZE 22 5% 1/10W
R1313	1-216-009-00	METAL GLAZE 22 5% 1/10W
R1314	1-216-009-00	METAL GLAZE 22 5% 1/10W
R1315	1-216-009-00	METAL GLAZE 22 5% 1/10W
R1316	1-216-009-00	METAL GLAZE 22 5% 1/10W
R1317	1-216-009-00	METAL GLAZE 22 5% 1/10W
R1318	1-216-009-00	METAL GLAZE 22 5% 1/10W
R1319	1-216-009-00	METAL GLAZE 22 5% 1/10W
R1320	1-216-073-00	METAL GLAZE 10K 5% 1/10W
R1321	1-216-073-00	METAL GLAZE 10K 5% 1/10W
R1322	1-216-073-00	METAL GLAZE 10K 5% 1/10W
R1323	1-216-073-00	METAL GLAZE 10K 5% 1/10W
R1324	1-216-073-00	METAL GLAZE 10K 5% 1/10W
R1325	1-216-073-00	METAL GLAZE 10K 5% 1/10W
R1326	1-216-073-00	METAL GLAZE 10K 5% 1/10W
R1327	1-216-073-00	METAL GLAZE 10K 5% 1/10W
R1328	1-216-073-00	METAL GLAZE 10K 5% 1/10W
R1329	1-216-073-00	METAL GLAZE 10K 5% 1/10W
R1330	1-216-073-00	METAL GLAZE 10K 5% 1/10W
R1331	1-216-073-00	METAL GLAZE 10K 5% 1/10W
R1332	1-216-073-00	METAL GLAZE 10K 5% 1/10W
R1333	1-216-073-00	METAL GLAZE 10K 5% 1/10W
R1334	1-216-073-00	METAL GLAZE 10K 5% 1/10W
R1335	1-216-073-00	METAL GLAZE 10K 5% 1/10W
R1401	1-216-347-11	METAL OXIDE 0.68 5% 1W F
R1402	1-216-031-00	METAL GLAZE 180 5% 1/10W
R1405	1-216-073-00	METAL GLAZE 10K 5% 1/10W
R1500	1-216-061-00	METAL GLAZE 3.3K 5% 1/10W
R1501	1-216-061-00	METAL GLAZE 3.3K 5% 1/10W

ENCODER, SCSI, BIF, OPL, L MOTOR, C MOTOR

Ref. No.	Part No.	Description			
R1502	1-216-061-00	METAL GLAZE	3.3K	5%	1/10W
R1503	1-216-061-00	METAL GLAZE	3.3K	5%	1/10W
R1504	1-216-061-00	METAL GLAZE	3.3K	5%	1/10W
R1505	1-216-061-00	METAL GLAZE	3.3K	5%	1/10W
R1506	1-216-061-00	METAL GLAZE	3.3K	5%	1/10W
R1507	1-216-061-00	METAL GLAZE	3.3K	5%	1/10W
R1509	1-216-061-00	METAL GLAZE	3.3K	5%	1/10W
R1510	1-216-061-00	METAL GLAZE	3.3K	5%	1/10W
R1511	1-216-061-00	METAL GLAZE	3.3K	5%	1/10W
R1512	1-216-061-00	METAL GLAZE	3.3K	5%	1/10W
R1513	1-216-061-00	METAL GLAZE	3.3K	5%	1/10W
R1514	1-216-061-00	METAL GLAZE	3.3K	5%	1/10W
R1515	1-216-061-00	METAL GLAZE	3.3K	5%	1/10W
R1549	1-216-073-00	METAL GLAZE	10K	5%	1/10W
R1551	1-216-073-00	METAL GLAZE	10K	5%	1/10W
R1552	1-216-073-00	METAL GLAZE	10K	5%	1/10W
R1553	1-216-073-00	METAL GLAZE	10K	5%	1/10W
R1554	1-216-073-00	METAL GLAZE	10K	5%	1/10W
R1555	1-216-073-00	METAL GLAZE	10K	5%	1/10W
R1556	1-216-073-00	METAL GLAZE	10K	5%	1/10W
R1557	1-216-073-00	METAL GLAZE	10K	5%	1/10W
R1558	1-216-073-00	METAL GLAZE	10K	5%	1/10W
R1559	1-216-073-00	METAL GLAZE	10K	5%	1/10W
R1601	1-216-073-00	METAL GLAZE	10K	5%	1/10W
R1701	1-216-041-00	METAL GLAZE	470	5%	1/10W
R1801	1-216-073-00	METAL GLAZE	10K	5%	1/10W
R1802	1-216-073-00	METAL GLAZE	10K	5%	1/10W
R1803	1-216-121-00	METAL GLAZE	1M	5%	1/10W
R1810	1-216-077-00	METAL GLAZE	15K	5%	1/10W
R1811	1-216-073-00	METAL GLAZE	10K	5%	1/10W
R1812	1-216-077-00	METAL GLAZE	15K	5%	1/10W
R1813	1-216-077-00	METAL GLAZE	15K	5%	1/10W
R1814	1-216-089-00	METAL GLAZE	47K	5%	1/10W
R1815	1-216-073-00	METAL GLAZE	10K	5%	1/10W
R1816	1-216-061-00	METAL GLAZE	3.3K	5%	1/10W
R1830	1-216-023-00	METAL GLAZE	82	5%	1/10W
R1831	1-216-029-00	METAL GLAZE	150	5%	1/10W
R1832	1-216-023-00	METAL GLAZE	82	5%	1/10W
R1833	1-216-029-00	METAL GLAZE	150	5%	1/10W
R1835	1-216-041-00	METAL GLAZE	470	5%	1/10W
R1836	1-216-073-00	METAL GLAZE	10K	5%	1/10W
R1840	1-216-057-00	METAL GLAZE	2.2K	5%	1/10W
		RESISTOR BLOCK			
RB1101	1-231-410-00	RESISTOR BLOCK 10K			
RB1102	1-231-410-00	RESISTOR BLOCK 10K			
RB1103	1-231-410-00	RESISTOR BLOCK 10K			
RB1501	1-235-005-00	RESISTOR BLOCK 47K			
RB1502	1-235-005-00	RESISTOR BLOCK 47K			
RB1601	1-231-410-00	RESISTOR BLOCK 10K			
		CONNCTOR			
S1601	1-568-683-11	PIN, CONNECTOR (PC BAORD) 2P			
S1801	1-568-683-11	PIN, CONNECTOR (PC BAORD) 2P			
		SWITCH			
SW1101	1-554-937-11	SWITCH, KEY BOARD			
SW1102	1-554-937-11	SWITCH, KEY BOARD			
		OSCILLATOR			
X1101	1-579-165-11	OSCILLATOR, CRYSTAL			
X1801	1-567-815-11	VIBRATOR, CRYSTAL			

★★

A-8080-763-A MOUNTED PCB, SCSI
★★★★★★★★★

CONNECTOR

CNJ901	1-691-865-11	CONNECTOR, SOCKET 50P
CNJ902	1-691-865-11	CONNECTOR, SOCKET 50P
CNJ903	1-695-125-11	PIN, CONNECTOR 50P
CNJ904	*1-506-489-11	PIN, CONNECTOR 10P

SWITCH

S901	1-570-922-11	SWITCH, DIP

★★

A-8080-764-A MOUNTED PCB, BIF
★★★★★★★★

CONNCTOR

CNJ905	1-691-864-11	CONNECTOR, SOCKET 36P
CNJ906	1-691-864-11	CONNECTOR, SOCKET 36P
CNJ907	1-695-124-11	PIN, CONNECTOR 34P
CNJ908	*1-506-491-11	PIN, CONNECTOR 12P

SWITCH

S902	1-570-922-11	SWITCH, DIP

★★

A-8080-765-A MOUNTED PCB, OPL
★★★★★★★★

CAPACITOR

C901	1-162-179-11	CERAMIC	0.1MF		50V

CONNECTOR

CN910	*1-563-728-11	SOCKET, CONNECTOR 8P
CNJ909	*1-568-063-11	HEADER, CONNECTOR 16P

IC

IC901	8-759-242-84	IC TORX176
IC902	8-759-242-85	IC TOTX176
IC903	8-759-242-85	IC TOTX176

INDUCTOR

L901	1-408-417-00	INDUCTOR	47UH	5%	

RESISTOR

R901	1-249-428-11	CARBON	8.2K	5%	1/4W
R902	1-249-428-11	CARBON	8.2K	5%	1/4W

★★

MOUNTED PCB, L MOTOR
★★★★★★★★★★

CAPACITOR

C655	1-130-471-00	MYLAR	0.001MF	5%	50V

CONNECTOR

CNJ609	*1-506-467-11	PIN, CONNECTOR 2P

★★

MOUNTED PCB, C MOTOR
★★★★★★★★★★

CAPACITOR

C654	1-130-471-00	MYLAR	0.001MF	5%	50V

CONNECTOR

CNJ608	*1-506-468-11	PIN, CONNECTOR 3P

SW-1, SW-2, RELAY, SW-3, LED, POWER LED

Ref. No.	Part No.	Description			
		MOUNTED PCB, SW-1 ★★★★★★★★★			
	*1-642-916-12	PC BOARD, L/C SW			
		CAPACITOR			
C651	1-136-157-00	FILM	0.022MF	5%	50V
C652	1-136-157-00	FILM	0.022MF	5%	50V
C653	1-136-157-00	FILM	0.022MF	5%	50V
		CONNECTOR			
CNJ607	*1-506-483-21	PIN, CONNECTOR 4P			
		SWITCH			
S653	1-553-636-00	SWITCH, MICRO			
S654	1-570-447-11	SWITCH, MICRO			
★★					
		MOUNTED PCB, SW-2 ★★★★★★★★★			
	*1-642-917-12	PC BOARD, IN SW			
		CONNECTOR			
CNJ606	*1-506-482-11	PIN, CONNECTOR 3P			
		SWITCH			
S651	1-554-205-00	SWITCH, PUSH			
★★					
		MOUNTED PCB, RELAY ★★★★★★★★★			
	*1-642-913-12	PC BOARD, LD-MTR			
		CONNECTOR			
CNJ601	*1-506-484-11	PIN, CONNECTOR 5P			
CNJ602	*1-506-481-31	PIN, CONNECTOR 2P			
CNJ603	1-569-333-11	CONNECTOR, BOARD TO BOARD 3P			
CNJ604	1-691-863-11	CONNECTOR, BOARD TO BOARD			
CNJ610	*1-506-481-11	PIN, CONNECTOR 2P			
		DIODE			
D651	8-719-200-02	DIODE 10E-2			
D652	8-719-200-02	DIODE 10E-2			
D653	8-719-200-02	DIODE 10E-2			
D654	8-719-200-02	DIODE 10E-2			
		TRANSISTOR			
Q651	8-729-140-96	TRANSISTOR 2SD774-34			
		RESISTOR			
R651	1-249-417-11	CARBON	1K	5%	1/4W
R652	1-249-417-11	CARBON	1K	5%	1/4W
★★					
		MOUNTED PCB, SW-3 ★★★★★★★★★			
	*1-642-918-12	PC BOARD, OUT SW			
		CONNECTOR			
CNJ605	*1-506-481-31	PIN, CONNECTOR 2P			
		SWITCH			
S652	1-554-205-00	SWITCH, PUSH			

Ref. No.	Part No.	Description
		MOUNTED PCB, LED ★★★★★★★★
	*4-623-180-01	SPRING, FITTING, LED
	*1-642-908-11	PC BOARD, FU-1
		CONNECTOR
CNJ951	1-506-486-11	PIN, CONNECTOR 7P
		DIODE
D951	8-719-025-66	DIODE GL8KG21
D952	8-719-939-32	DIODE GL8HY21
D953	8-719-939-32	DIODE GL8HY21
D954	8-719-027-96	DIODE SLB-25YY
		SWITCH
S951	1-570-992-21	SWITCH, KEY BOARD
★★		
		MOUNTED PCB, POWER LED ★★★★★★★★★★★
	*1-642-909-11	PC BOARD, PI-1
		CONNECTOR
CNJ952	*1-506-481-11	PIN, CONNECTOR 2P
		DIODE
D955	8-719-025-66	DIODE GL8KG21
★★		
		ACCESSORIES AND PACKING MATERIALS ★★★★★★★★★★★★★★★★★
	1-512-026-11	CONNECTOR
	1-690-884-11	CORD, CONNECTION (SCSI2)
	3-704-298-01	BAG (STANDARD), PROTECTION
	⚠3-754-925-03	(JAP)...MANUAL, INSTRUCTION
	⚠3-754-925-13	(ENG, FRA, GER)...MANUAL, INSTRUCTION
	4-618-587-01	CUSHION
	4-623-366-01	INDIVIDUAL CARTON

APPENDIX
B- I/F COMMAND

1.1. B-I/F Command

B-I/F command sequence is executed as follows.

1) The Host Computer issue a B-I/F command.
2) The Writer get the command and executed.
3) The Writer return the result of execution into the Sense Data.
4) The Host Computer get the Sense data.

1.2. Sense Data

The Sense Data the Writer returned is the stream of byte data. The length of the Sense Data is greater than or equal to 14 bytes. The first 14 bytes of the Sense Data are common to all B-I/F Commands. The Sense Data after byte14 are called Additional Sense Data and depend on each command.

byte	bit7	bit6	bit5	bit4	bit3	bit2	bit1	bit0
0	Return Code							
1	Error Code							
2	OC Di	Pseudo	Status Code					
3	Av Db	Reserved						
4	Disc Information byte							
5	Lead-out Time Code (Minute in BCD)							
6	Lead-out Time Code (Second in BCD)							
7	Lead-out Time Code (Frame in BCD)							
8	Current Time Code (Minute in BCD)							
9	Current Time Code (Second in BCD)							
10	Current Time Code (Frame in BCD)							
11	Reserved					Leadin	Subcode	ATIP
12	Sequencer Task Error Code							
13	Mechacon Task Error Code							
14	Additional Sense Data							
15								
16								
:								
n								

1.2.1. Return Code

00h OK
01h BUSY
02h NG

If the Return Code is OK, the Writer has executed the command successfully. Busy means that the Writer is executing a command and cannot accept a next command except Initialize and Reset command. When the Return Code is NG, the Writer failed to execute a command. The detail of failure is described in Error Code, Sequencer Task Error Code and Mechacon Task Error Code field.

1.2.2. Error Code

00h No Error
01h Illegal Command
06h Focus Error
07h Spindle Error
08h Sled Error
09h Seek Error
0Dh Read/Write Abort Error
10h Illegal Parameter
11h Open/Close Error
13h Tracking AGC Error
14h EEPROM Read/Write Error
15h Inappropriate Command
16h Command Abort
17h ATIP Continuity Error
19h Write Power Calibration Failure
1Bh Damaged Disc
1Ch Not Enough Recordalble Area
1Dh No EFM
1Eh EFM PLL Unlock Error
1Fh No PCA
20h OS Error
21h Illegal Max Write Power

1.2.3. Status Code

00h RESET
01h OPEN
02h CLOSE
03h READ
04h WRITE
05h PAUSE
07h DOUBLE SPEED READ
08h DOUBLE SPEED WRITE
09h DOUBLE SPEED PAUSE
0Bh DEBUG MODE

1.2.4. Disc Information byte

bit 7-6: reserved
bit 5: Damaged
bit 4: New Disc
bit 3: Unfinished Disc
bit 2: Complete Disc(CD)
bit 1: 12cm Disc
bit 0: 8cm Disc

1.2.5. Sequencer Task Error Code

The Sequencer Task Error Code is internal code of the Writer control program. This code delivers the information of failure in more detail than Error Code. When the Sequencer Task Error Code dosen't descrive the accident clearly, the Mechacon Task Error Code may help you.

00h No Error
01h Illegal Command (unknown command)
02h Invalid Command (inappropriate command)
03h Illegal Parameter
04h Invalid Parameter
05h Information is not available
10h Read Focus Error (CD)
11h Write Focus Error (CD-R)
12h ATIP Spindle Error
13h Subcode Spindle Error
14h Continuity Error of ATIP Address
17h Unlocked EFM PLL Error
18h Read Focus Error (CD-R)
20h during OPEN action
21h during CLOSE action
22h during SLED HOME action
23h during SLED IN action
24h during SLED OUT action
25h during FOCUS SEATCH action
26h during PICKUP UP/DOWN action
27h during SPINDLE FV action
28h during SPINDLE CD action
29h during SPINDLE CD-R action
2ah during TRACKING AGC action
2bh during STOP SERVO action
2ch during WRITE LD ON action
2dh during WRITE LD ON2 action
2eh during WRITE LD OFF action
2fh during ABORT action
31h during CHECK DISC TYPE action
32h during CHECK DISC SIZE action
33h during TRACK JUMP CD-R action
34h during TRACK JUMP CD action
35h during TRACKING GAIN UP action
36h during SEEK CD-R action
37h during SEEK CD action
38h during PAUSE CD-R action
39h during SEEK CD action
3ah during GOTO LEAD IN action
3bh during WET WITE POWER action
3ch during PRE-WRITE action
3dh during PRE-READ action

3eh during READ TOC action
3fh during READ ATIP INFORMATION action
40h during READ A/D action
41h during START OPC action
42h during STOP OPC action
43h Asymmetry detection error 0
44h Asymmetry detection error 1
45h Cannot calibrate roughly
46h Cannot detect high point
47h Cannot detect low point
48h Write NG
49h The disc has no PCA.
4ah during READ PMA action
4bh Write power calibration failure
4ch during LOCK EFM action
4dh Illegal max power
4eh Recordable area is not enough.
4fh during LD CONTROL action

No Error (00h)
There is no error.

Illegal Command (01h)
The command send to the Sequencer Task is not supported. This error cannot occur. If this error has occurred, the reason may be trouble around CPU or bug of the program.

Invalid Command (02h)
The command cannot be execute in this status. When this error has occurred, Error Code should be Inappropriate Command(15h).

Illegal Parameter (03h)
The parameter(s) of the command for the Sequencer Task is(are) bad format, e.g. BCD.

Invalid Parameter (04h)
The parameter(s) of the command for the Sequencer Task has(have) invalid value.

Information is not available (05h)
When ATIP information or TOC has been read yet, the Sequencer Task try to use these information.

Read Focus Error (10h)
The read focus servo was unlocked.

Write Focus Error (11h)
The focus servo was unlocked during writing.

ATIP Spindle Error (12h)
The spindle servo for CD-R was unlocked.

Subcode Spindle Error (13h)
The spindle servo for CD was unlocked.

Continuity Error of ATIP Address (14h)
During writing, the pickup jump over the track because of shock.

During OPEN action (20h)
An error has occurred during OPEN action. The detail information of the error is indicated in the Mechacon Task Error Code.

During CLOSE action (21h)
An error has occurred during CLOSE action. The detail information of the error is indicated in the Mechacon Task Error Code.

During SLED HOME action (22h)
An error has occurred during SLED HOME action. The detail information of the error is indicated in the Mechacon Task Error Code.

During SLED IN action (23h)
An error has occurred during SLED IN action. The detail information of the error is indicated in the Mechacon Task Error Code.

During SLED OUT action (24h)
An error has occurred during SLED OUT action. The detail information of the error is indicated in the Mechacon Task Error Code.

Asymmetry detection error 0 (43h)
Asymmetry detection error 1 (44h)
Cannot calibrate roughly (45h)
Cannot detect high point (46h)
Cannot detect low point (47h)
These error code indicate that calibration of optimal write power was failed.

Write NG (48h)
Writing was discontinued.

The disc has no PCA (49h)
The inserted CD-R has enough area to calibrate the optimal write power.

Write power calibration failure (4bh)
The calibration of the optimal write power in the write stand-by sequence are failed.

Illegal max power (4dh)
The value of max write power in EEPROM is 00h or ffh.

Recordable area is not enough (4eh)
The data length indicated in the parameter of Write Standby command is longer than the time at which the lead-out can start.

1.2.6. Mechacon Task Error Code

The Mechacon Task Error Code indicates the reason of failure in the process which control hardware directly. This code is also for internal use like the Sequencer Task Error Code.

00h OK.
01h Timeout or over retry count
02h Invalid Parameter
03h AGC Error
04h No EFM
05h Spindle Error
06h (1-fwd) Timeout between start and DIRC=L
07h (1-rev) Timeout between start and DIRC=L
08h Timeout of checking spindle ok (CD-R)
09h Timeout of checking spindle ok (SUBCODE)
0ah (10-fwd) Timeout between start and DIRC=L
0bh (10-fwd) Timeout between DIRC=L and DIRC=H
0ch (10-rev) Timeout between start and DIRC=L
0dh (10-rev) Timeout between DIRC=L and DIRC=H
0eh (2N-fwd) Timeout between start and brake
0fh (2N-fwd) Timeout between brake and overflow
10h (2N-rev) Timeout between start and brake
11h (2N-rev) Timeout between brake and overflow
12h (N-fwd) Timeout between start and servo-on
13h (N-rev) Timeout between start and servo on
14h Can not open tray
15h Can not close tray
16h No Disc (no FOK signal during focus search)
17h Can not read TOC
18h Can not read ATIP special information
19h Illegal Write Power
1ah EFM PLL is unlocked

1.3. How to use B-I/F commander

This is the section for the user to operate the Writer by B-I/F command. There are typical instances of combination of B-I/F commands.

1.3.1. Initialize Writer

1) Power on.
2) Issue Reset command (0bh XXh). When normal EFM is input to writer, XX is 00, otherwise 02.

This sequence is to initialize the Writer. Receiving Reset command, the Writer stop all servo and reset all internal values and then pulls EFM PLL in and checks what kind of disc is inserted when the tray is close.

When the Writer is connected with the Encoder by B-I/F, the Writer is initialized by the Encoder automatically after a power up. It is not guaranteed that the Writer executes all B-I/F commands normally until Reset command is issued. So it is recommended to initialize the Writer with Rest command.

1.3.2. Change EFM speed.

1) Stop all servo.
1) Change EFM speed.
2) Issue Reset command (0bh XXh; when normal EFM is input to writer XX is 00, otherwise XX is 02.)
Or issue Lock EFM command (67h 2eh XXh 00h 00h 00h 00h 00h 00h 00h; when normal speed XX is 00, otherwise XX is 40.)

Changing the speed of EFM input to the Writer, the Writer must know the new EFM speed to control spindle servo. When Lock EFM command is issued, the Writer remembers the speed and pulls the EFM PLL in.

1.3.3. Spin CD up

1) Insert CD.
2) Wait for a minutes. (The Writer check if CD, CD-R, Damaged Disc or No Disc is inserted)
3) Issue Spindle FV command (67h 07h 00h 00h 00h 00h 00h 00h 00h 00h).
4) Issue Focus On command (67h 05h 00h 00h 00h 00h 00h 00h 00h 00h).
5) Issue Tracking On command (67h 0ah 00h 00h 00h 00h 00h 00h 00h 00h).
6) Issue Spin Up CD command (67h 27h XXh 00h 00h 00h 00h 00h 00h 00h). When rotational speed is normal, XX is 00, otherwise XX is 40.

Spindle FV, Focus On and Tracking On command must be issue in this order. You may issue Sled Home command, Sled In command and Sled Out command before Tracking On command is executed. If you want to move the pickup quickly to the position you want, you should move the pickup by Sled In or Out command before tracking on. In this case, the parameter of Spin Up CD command should be 01 (normal speed) or 41 (double speed) to avoid moving sled to home.

Spin Up CD command is combination of Spindle FV, Focus On, Tracking On and Spindle CD command. So you can issue the Spindle CD command without Spindle FV, Focus On or Tracking On command. For instance, you can only issue the Spindle FV command before Spin Up CD command, then Focus servo and Tracking servo are on by Spin Up CD command automatically.

In case of CD, the rotational speed of the spindle doesn't have to correspond to the EFM speed.

1.3.4. Spin CD-R up

1) Insert CD-R.
2) Wait for a minutes. (The Writer check if CD, CD-R, Damaged Disc or No Disc is inserted)
3) Issue Spindle FV command (67h 07h 00h 00h 00h 00h 00h 00h 00h 00h).
4) Issue Focus On command (67h 05h 00h 00h 00h 00h 00h 00h 00h 00h).
5) Issue Tracking On command (67h 0ah 00h 00h 00h 00h 00h 00h 00h 00h).
6) Issue Spin Up CD-R command (67h 28h XXh 00h 00h 00h 00h 00h 00h 00h). When rotational speed is normal, XX is 00. Otherwise XX is 40.

Spindle FV, Focus On and Tracking On command must be issue in this order. You may issue Sled Home command, Sled In command and Sled Out command before Tracking On command is executed. If you want to move the pickup quickly to the position you want, you should move the pickup by Sled In or Out command before tracking on. In this case, the parameter of Spin Up CD-R command should be 01 (normal speed) or 41 (double speed) to avoid moving sled to home.

Spin Up CD-R command is combination of Spindle FV, Sled Home, Sled Out, Focus On, Tracking On and Spindle CD-R command. So you can issue the Spindle CD-R command without Spindle FV, Focus On or Tracking On command. For instance, you can only issue the Spindle FV command before Spin Up CD-R command, then Focus servo and Tracking servo is on by Spin Up CD-R command automatically.

In case of CD-R, the rotational speed of the spindle must correspond to the EFM speed.

1.3.5. Write CD-R

1) Spin Up CD-R (See Section 1.4)
2) Issue Power Calibrate command (67h 24h XXh MMh SSh FFh 00h 00h 00h 00h; XX is 00 when the rotational speed is normal, otherwise 40. MM:SS:FF is start time to calibrate write power).
And get the optimal write power from byte14 of returned sense data.)
3) Issue Set Write Power command (67h 1bh PPh 00h 00h 00h 00h 00h 00h 00h;
PP is usually optimal write power).
4) Issue Write LD On command (67h 0dh 00h 00h 00h 00h 00h 00h 00h 00h)

Power Calibrate command is to get the optimal write power. When you have already known the optimal write power or substitute a certain write power for optimal one, you may not issue this command.

Set Write Power command is to set the power for writing. The power to be set must be less than or equal to the max write power which is indicated in LSB of address 0 of EEPROM.

1.3.6. Replace Writer PCB

1) Issue Save Hours Meter command (this command is composed of Read EEPROM Command)
2) Hit F2 (Function Key 2) to save displayed values into a file.
3) Input serial number of CDW-900E.
4) Replace Writer PCB.
5) Issue Restore Hours Meter command (this command is composed of Write EEPROM Command)
6) Input serial number of CDW-900E.
7) Hit F3 (Function Key 3) to set displayed valued to Writer's Hours Meter.

When a Writer PCB is substituted to new one without substitution the BU, the new Writer PCB's Hours Meter must be equal to old one. So you must save values of old PCB's Hours Meter by using of Save Hours Meter command before substituting the PCB. And after substituting the PCB, you must restore the old values to new PCB's Hours Meter by using of Restore Hours Meter command.

1.3.7. Analyzing Writer Hardware

When an error occurs in the writer hardware, it is possible to check the operating condition at the moment which is immediately before the error occurred, by executing the Read Writer Info command.

1.3.8. READ WRITER INFO

Name : Read Writer Information Command
Code : 0D 00
Additional Sense Data : byte14-17 Length of the information in byte.
byte18-25 Vender name ("Sony")
byte26-41 Product name ("CDW-900E")
byte42-45 ROM revision ("X.XX", X is the digit.)
byte46- EEPROM data

The Writer reruns the vender name, product name, ROM revision and EEPROM data. The Writer stores some information to the EEPROM when a hard error occured. So this command is useful for diagnosis of the Writer. When this command is issued, the B-I/F Commander shows the information as follows:

Vendor	The vendor name.
Product	The product name.
Version	The version of the firmware of Writer.
Max write power	The limit of LD power durring writing.
Hours Meter(Write)	The sum of write time at nomal and double speed
Hours Meter(Double)	The sum of write time at double speed.
Hours Meter(Power ON)	The sum of time during the Writer turning on.
Sequencer error	The sequencer task error code
Mechacon error	The mechacon task error code
B-I/F command	The issued command before the hard error occured.
Main task status	The main task status code
Sequencer command	The sequencer command issued by main task
Function in Sequencer	The funciont in sequencer task
Mechacon command	The mechacon command issued sequencer task
Subcode	The time of subcode when the hard error occured.
ATIP	The time of ATIP when the hard error occured.
Open/Close SW	whether Open/Close switch was enable or disable
Write mode	Enable or Disable writing and write power. when the hard error occured.
A/D value	Sampling values of RF when the hard error occured.
I/O ports	The values of I/O ports
OS error	OS error code when OS error occured.
Number of	The number of hard errors and discs the Writer wrote.

1.3.9. READ EEPROM

These information can be saved into a file by F2 (Function Key 2). You can also get these information of EEPROM by using Read EEPROM command. The map of EEPROM is as follows:

address	MSB	LSB
00	Max Write Power (/10mw)	Max Write Power (hex)
01	Sum of normal and double speed writing time (MSW)	
02	Sum of namal and double speed writing time (LSW)	
03	Sum of double speed writing time (MSW)	
04	Sum of double speed writing time (LSW)	
05	Sum of power on time (MSW)	
06	Sum of power on time (LSW)	
07	B-I/F Command (byte0)	B-I/F Command (byte1)
08	B-I/F Command (byte2)	B-I/F Command (byte3)
09	B-I/F Command (byte4)	B-I/F Command (byte5)
0a	B-I/F Command (byte6)	B-I/F Command (byte7)
0b	B-I/F Command (byte8)	B-I/F Command (byte9)
0c	Subcode Min	Subcode Sec
0d	Subcode Frame	Bit7:Open/Close disable, Bit6:Pseudo write
0e	ATIP Min	ATIP Sec
0f	ATIP Frame	Write Power (D/A value)
10	Main task status	Function in Sequence task